the OIL AND GAS JOURNAL

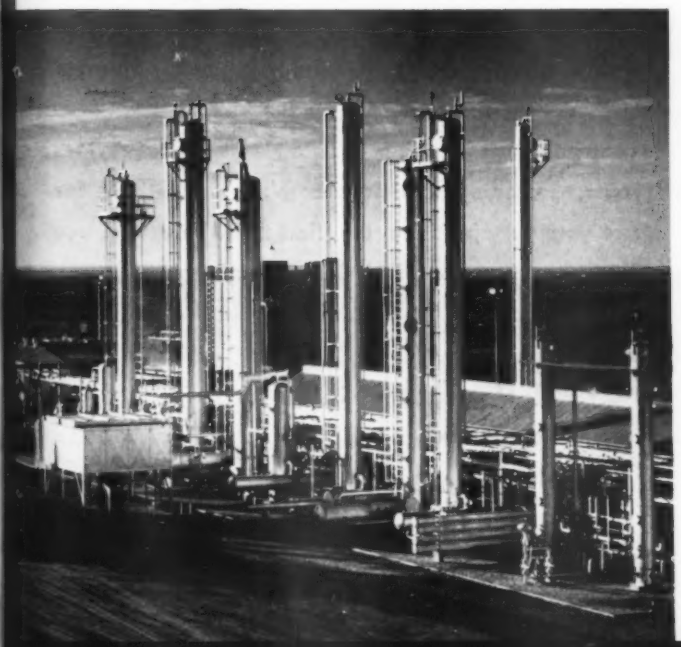
TOP PERFORMANCE

in any Season

WHEN YOU USE WARREN'S *Stabilized*

NATURAL GASOLINE OR STA-VOL-ENE

For INCREASED VAPOR PRESSURE



NATURAL GASOLINE
Butane
Propane
Iso-Butane
Iso-Pentane
Hexane
Heptane
STA-VOL-ENE

WARREN PETROLEUM CORPORATION

Producers, Manufacturers, Exporters and Marketers

Export Terminals: Corpus Christi, Port Arthur, Baytown, Texas City, and Norsworthy, Houston, Texas.

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WARREN'S MADDEN, TEXAS PLANT

Crude Oil, Natural Gasoline and Liquefied Petroleum Products

PRICE 50 CENTS TABLE OF CONTENTS PAGE 51 **FEBRUARY 15, 1951**

Operators say it's TRUE!

When experienced operators say "Lane-Wells does a dash-blank good perforating job," there's an opinion worth listening to. And experienced operators in every field — veterans and smart younger men — do say just about that.

Some of these canny old-timers have been using Lane-Wells services for nearly 18 years; according to them, there's no substitute for experience Lots of younger operators, too, find that the experience gained in over 143,000 perforating jobs helps a lot on their jobs — so they use Lane-Wells perforating.

Not all operators feel that way. We never claimed to bat 1.000 all the time. Even Ivory soap says only, '99-44/100% pure': perfection costs *more* than anyone can afford. But Lane-Wells batting average is, and always has been, in the high 900's. And lots of operators like Lane-Wells service because we don't alibi if something does go wrong, because we do our best to make it good. Ask *your* Lane-Wells man about

Better Perforating

by LANE WELLS

General Offices, Export Office and Plant • 5610 So. Soto St. Los Angeles 58, California

Los Angeles • Houston • Oklahoma City
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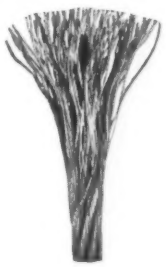
Petro-Tech Service Co. in Venezuela

402

EXTRA VALUE... BIG

EXTRA COST... SMALL

Form-Set (preformed) wire rope. For purposes of illustration, two strands have been lifted away from the core. Note that the lack of internal tension keeps wires from popping out of place.



Here's what's apt to happen when non-preformed rope is cut. This "bushing" can't occur in a Form-Set rope.

Form-Set (preformed) rope has so many advantages over the non-preformed type . . . yet now costs so very little more.

When Bethlehem announced its reduced price differential between Form-Set rope and the non-preformed kind, it was expected that a great many wire-rope users would immediately change to Form-Set. They did—in such large numbers that even we were surprised.

Perhaps we shouldn't have been.

For the new price structure now puts Bethlehem preformed rope within the reach of all. At little more than the cost of non-preformed rope, you can now have the better spooling and easier handling that Form-Set makes possible; the greater resistance to bending fatigue, and in many cases increased rope life.

Form-Set is virtually free of internal tension. It's a "friendly" wire rope; that is, it's so easy to rig, and it glides so smoothly over sheaves and drums. And you'll find, too, that it doesn't kink readily; that's one of its best points.

In fact, it has so many good points that use alone can bring them all to your attention. We suggest that you try a reel if you haven't already done so. There's economy in every inch of Form-Set.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

When you think **WIRE ROPE** *. . . think* **BETHLEHEM**

Hold High Pressures

WITH GUIBERSON HIGH PRESSURE STRIPPERS

TYPE "JUS" HIGH PRESSURE STRIPPER
Incorporates slip and bowl with packing gland.

Both types made for 2", 2½" or 3" tubing.
Also may be used for 1", 1¼" and 1½" macaroni strings.
Can be furnished with 6" series 400, 600 or 900 or 8" series 400 bottom flange.

TYPE "JU" HIGH PRESSURE STRIPPER
Flat top of packing gland accommodates Guiberson Type "B" tubing spider.

For running or pulling tubing under pressure, for clean-out work using reverse circulation—for *any* heavy-duty job where efficiency and success depend on a non-rotating high pressure stripper—Guiberson has the answer at low cost.

- 2 Models—"JU" without slips
  —"JUS" with slips
- Tubing collars pass without leakage!
- 3-inch adjustment on packing rubber!
- Rubbers can be changed without taking stripper from well head!
- Slips hold tubing fast but won't stick in bowl!

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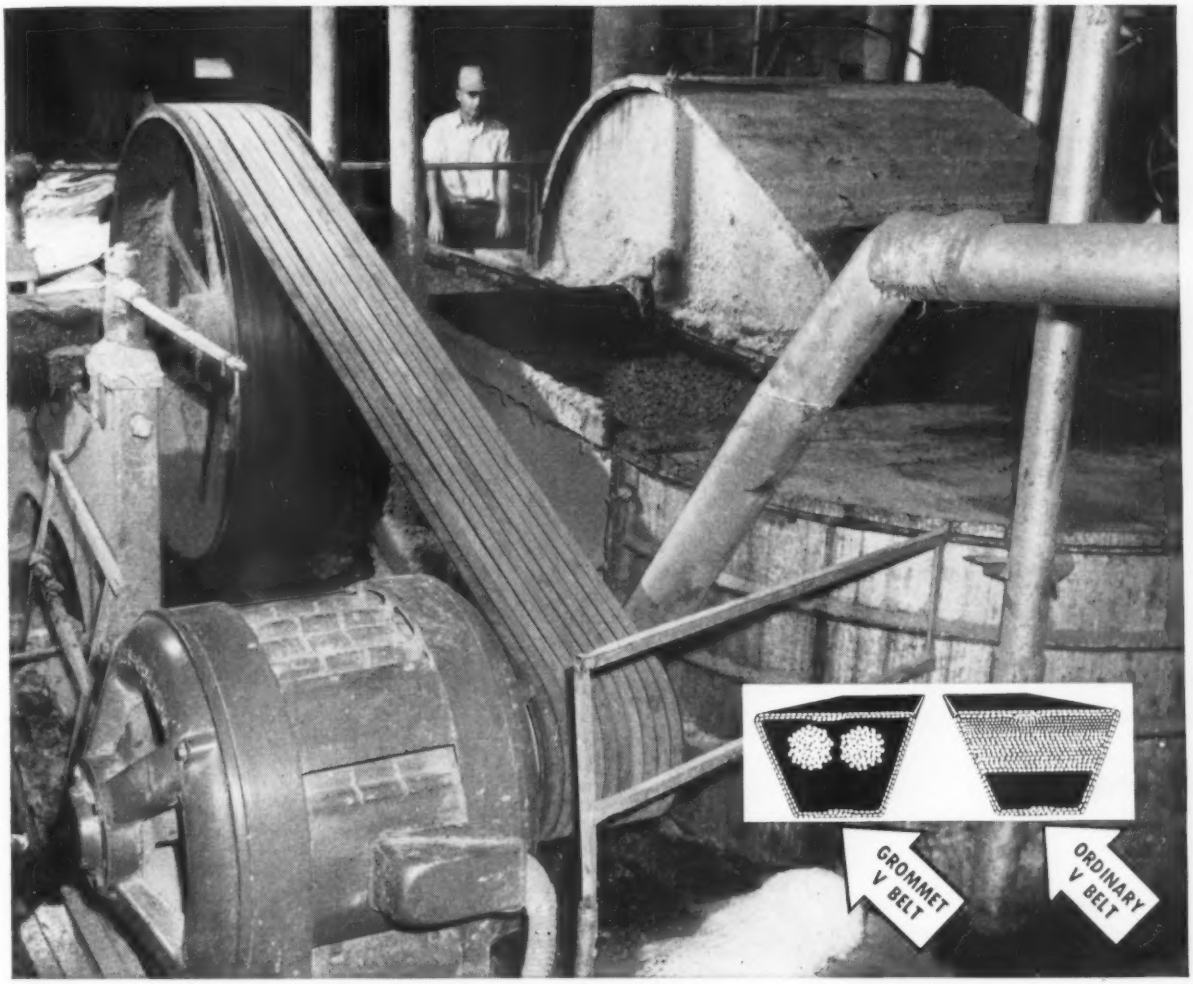
GUIBERSON
CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

Write today for the 1951 Guiberson catalog!

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Why grommet V belts last 20 to 50% longer

THESE B. F. Goodrich grommet V belts have been running constantly for two years without losing a single minute due to belt trouble. Why?

Twin grommets eliminate causes of belt failures — The B. F. Goodrich grommet is made by winding heavy cord on itself to form an endless loop. There are two of these grommets, placed close to the driving faces of the belt. They make up the load-carrying section. No fabric plies to stiffen and build up heat. Because most belt failures occur where cords overlap, this *endless* cord section eliminates the cause of belt failures.

Grommets work all the time — In an ordinary belt much of the cord strength is lost, wasted in the center of the belt where the cords don't pull their share of the load. But in the grommet belt, there are no center cords to loaf. The grommets do the work, stay at it all the time.

Grommet V belts last longer — Laboratory and field tests show grommet V belts last 20 to 50% longer. The twin grommet construction (U. S. Patent No. 2,233,294) is a result of the constant research going on at B. F. Goodrich. No other V belt is a grommet V belt. Now available in C, D and E sections.

A special demonstrator "X-ray" belt has been made to show the grommet construction. Ask your local BFG distributor to bring it around. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, O.*

Grommet V Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

Here's the rig you asked for–

Easy to operate... Fast... Economical for 6,000 to 10,000-foot work

The New "Oilwell" NO. 76

IT'S LIGHT IN WEIGHT

... with capacities far beyond most rigs of comparable size and weight.

IT'S EASY TO MOVE

... either with the compound or disconnected from it.

IT'S COMPACT

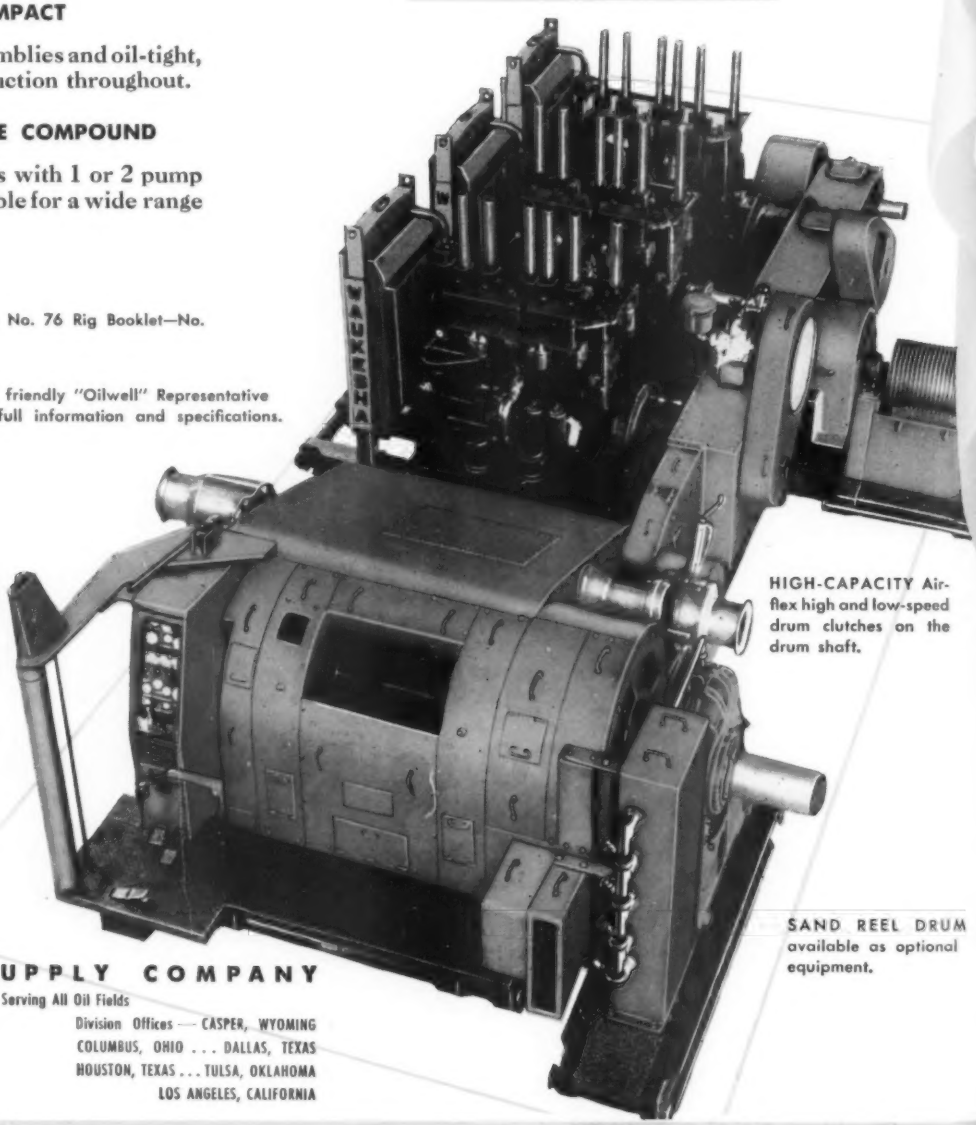
... with unitized assemblies and oil-tight, weatherproof construction throughout.

HIGHLY FLEXIBLE COMPOUND

... for 2 or 3 engines with 1 or 2 pump drives, makes it suitable for a wide range of applications.

... WRITE for our new No. 76 Rig Booklet—No. 2-51.

... OR ASK your friendly "Oilwell" Representative for full information and specifications.



BRAKE FLANGES are water cooled by a fully enclosed water circulating system.

ALL CONTROLS centrally located in a compact control panel which can be closed when moving.

HIGH-CAPACITY Air-flex high and low-speed drum clutches on the drum shaft.

SAND REEL DRUM available as optional equipment.

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"OILWELL" TRADE MARK

UNITED STATES STEEL

piping repairs *cost more* now!

No. 488 Iron Body Clamp Gate

You make them less often by using Dependable Quality

CRANE VALVES

...That's why more Crane Valves are used than any other make

easy access prevents trouble with this valve

Remove just two nuts to dismantle this gate valve for inspection, cleaning, or repairs—without taking it from the line. Reassemble just as easily, knowing that Crane clamp design keeps the bonnet joint snug and accurately aligned. Use Crane Clamp Gates on steam, water, and air, but especially in heavy fluid lines needing periodic cleanout. They'll save time, labor, and encourage regular servicing that prevents valve trouble.

Combining easy access with highly dependable service features, Crane Clamp Gates typify Crane Quality—*better valve performance at lowest ultimate cost.*

CRANE

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

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Easy to operate... Fast... Economical for 6,000 to 10,000-foot work

The New "Oilwell" NO. 76

IT'S LIGHT IN WEIGHT

... with capacities far beyond most rigs of comparable size and weight.

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... either with the compound or disconnected from it.

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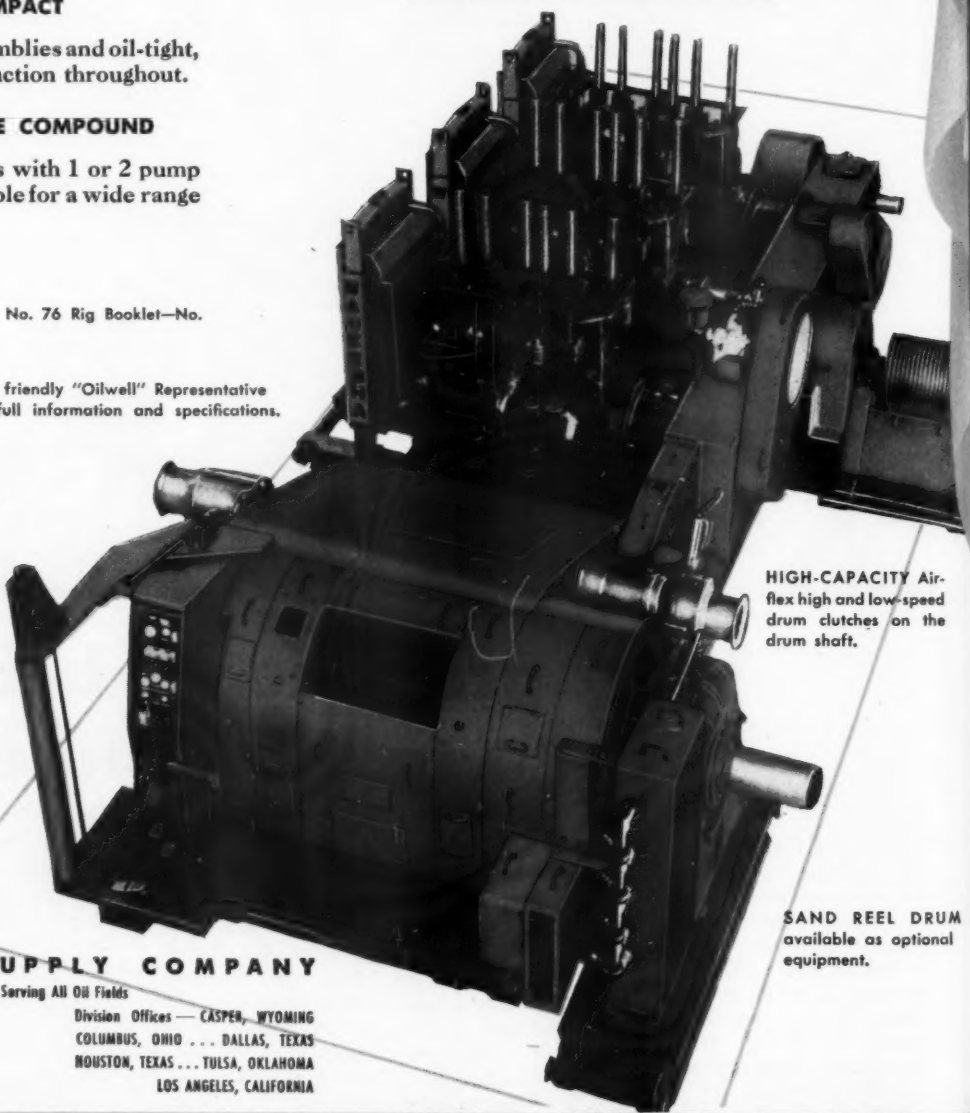

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piping repairs cost more now!

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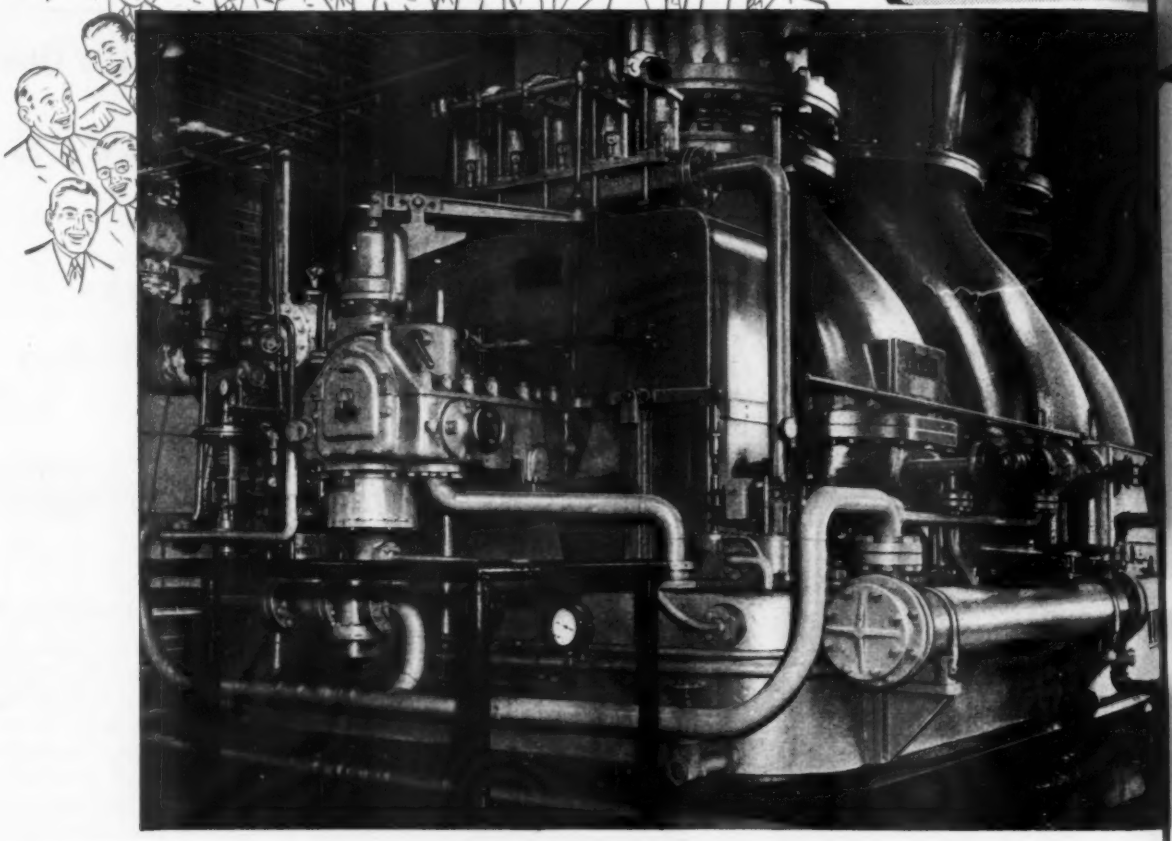
The talk of the oil industry!

...ALL R FOR N



The Elliott turbine-driven centrifugal blower, which contributed to this outstanding record, has a capacity of 50,100 inlet cfm and discharges at 15 psig; the driving turbine develops about 3500 hp at 3740 rpm. Blower provides air for catalyst regeneration and for circulation of catalyst at a rate of 1200 tons per hour.

ELLIOTT COMPANY

Centrifugal Blower Dept.

RECORDS BROKEN NON-STOP OPERATION

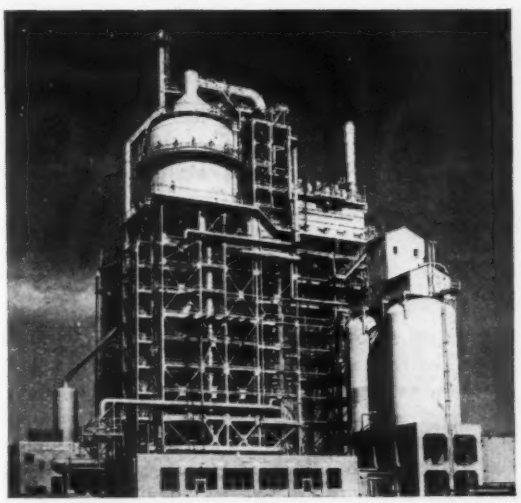
[redacted] pictured at the left, located at the Sunray Oil Corporation plant, Sunray, Okla., near Duncan, is helping to make history in fluid catalytic cracking. Starting operation in March, 1949, it has already exceeded all previous long-run records and, up to Jan. 1, had piled up the amazing total of 665 days with no evidence of fatigue or drop in efficiency. This operating record is a real tribute to the equipment making up the cat cracker unit and to the operating personnel of the refinery.

[redacted]

to carve itself a niche in the industrial hall of fame. The previous non-stop record in catalytic cracking, 610½ days, was also made with the aid of an Elliott blower at the refinery of the Tidewater Associated Oil Company, Avon, Calif. *It takes an Elliott blower to beat an Elliott blower.*

In many other refineries Elliott blowers, driven by Elliott turbines or motors, are demonstrating their dependability — contributing savings instead of maintenance costs. If you value this type of performance, check with Elliott engineers regarding your own specific requirements.

It should be added that numerous Elliott mechanical drive turbines are also a part of this cat cracker unit, contributing their share to the non-stop run.



The fluid "cat cracker" at Sunray Oil Corporation, Sunray, Oklahoma, was originally built and operated by Associated Refineries, Inc. during World War II. After remaining idle for several months, the refinery was purchased by Sunray in 1947 and was again put on stream in the spring of 1948. It has now been in continuous operation since March, 1949.

P-1091

ELLIOTT COMPANY JEANNETTE, PA.

Works at JEANNETTE, PA. • RIDGWAY, PA.
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DISTRICT OFFICES IN PRINCIPAL CITIES

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Every single performance feature *improved*

...that's the Beechcraft Bonanza for '51

- Cruising speed boosted to 175 mph
- Top speed is now 190 mph
- Range increased to 775 miles
- Rate of climb now 1,100 fpm
- Service ceiling raised to 18,000 feet
- Fuel economy now 19.9 miles per gallon
- Take-off rating now 205 hp. at 2,600 rpm

And so on—through innumerable refinements! The results give you higher, more efficient performance levels in all important categories. The new all-over paint design is now standard. And inside the roomy four-place cabin you'll find new color styling. Front seats with more "ease" built in. Two-position rear seat with head rests. Increased ventilation. Choice of smart upholstery.

There's a new Beechcraft metal propeller, and Lear VHF radio receiver, transmitter, and low frequency receiver, too. Safety and ruggedness? That's an *old* story to this sturdy plane! See your Beechcraft distributor for *all* the facts on this great, new Model C35. Or write on your company letterhead to Beech Aircraft Corporation, Wichita, Kansas, U.S.A. Scores of improvements, plus the Bonanza's famous qualities tested by more than 2,600 now in service, make it *the* buy for '51!

Beechcraft

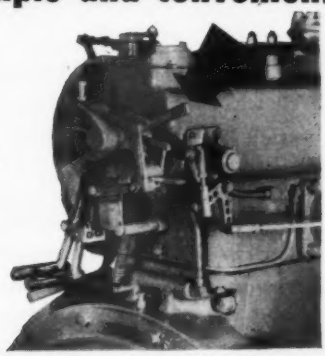
BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

MURPHY DIESEL

DUAL-FUEL Engines . . .

Fuel Changeover is simple and convenient



Simplicity is the keynote of Murphy Dual-Fuel operation — start the engine on diesel fuel and warm it up. Throwing one lever (see arrow above) switches the engine to dual-fuel operation. That's all there is to it!

. . . give you . . .

- Greater Economy
- Longer Life
- Standby Protection
- Simplicity of Design
- Relative Lightweight
- Rugged Construction
- Quick Starting
- Compactness
- Heavy Duty Power
- Simpler Operation — No Complicated Adjustments
- Instant Fuel Change — Insures Continuous Operation
- Full Power on Either Fuel Without Additional Parts

Write for a copy of Bulletin 107, today. It gives full details.

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XUM

Power transmission to off-shore wells with the help of...

"326" MONEL SHIELDED CABLE

Photo by Vachon, courtesy Standard Oil Company (New Jersey)

Here's the kind of cable that stands up under the severely corrosive conditions of off-shore operation... either carrying power to off-shore wells, or to bottom-hole equipment in these wells.

It's called "326"® Monel Shielded Cable.

"326" Monel—a *non-magnetic* high-Nickel alloy—has many characteristics that make it an excellent shielding material.

Like all INCO Nickel Alloys, "326" Monel is *rustproof* and highly resistant to a long list of commonly-met corrosives. Salt water and sour crudes, of course, are among them.

"326" Monel also possesses high physical properties—strength, toughness, and resistance to abrasion and mechanical damage And it is readily brazed, soldered and welded.

Because of these characteristics "326" Monel Shielded Cable is a natural for applications where maintenance is not only costly but inconvenient.

And here's another important point. This cable is economical in price. It costs no more than other good metal-shielded cable. In some types, it actually costs *less.*

A number of well-known cable companies make "326" Monel Shielded Cable. ***But right now — with all metals in short supply because of the demands of the national rearmament and defense program — we can't promise how much will be available.***

But there are some things we *can* do. One of them is to be Johnny-on-the-spot when you run into problems involving metals for oil field use. INCO's Technical Service welcomes the opportunity to work with you. Write for their suggestions and recommendations. Naturally, this assistance is yours for the asking—no cost, no obligation involved.

EMBLEM OF SERVICE INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

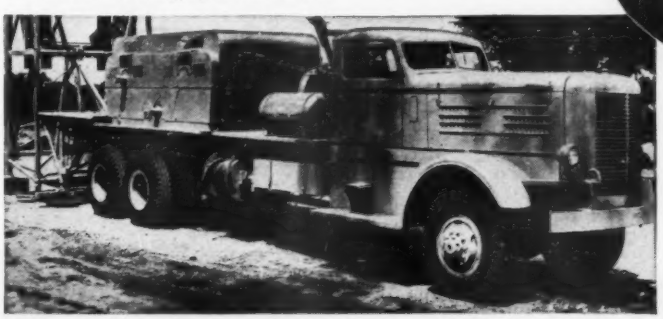
Building Pipelines . . . Transporting Power Units . . .

Moving Tank Cars— **GENERAL**

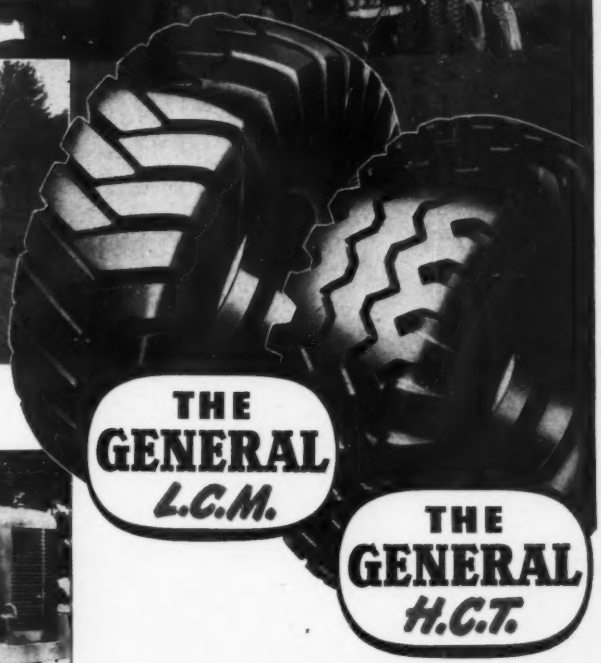
GETS ALL JOBS DONE

FASTER! SAFER! CHEAPER!

Off-the-road jobs require the extra strength and traction the General L. C. M. gives. No slipping, sliding, spinning. Massive lugs of rubber form a self-cleaning, open-center tread.



Over-the-highway, the General H. C. T.'s broad, free-rolling tread ribs put more rubber on the road for more safety, even wear, quicker stops on dry or wet pavement.



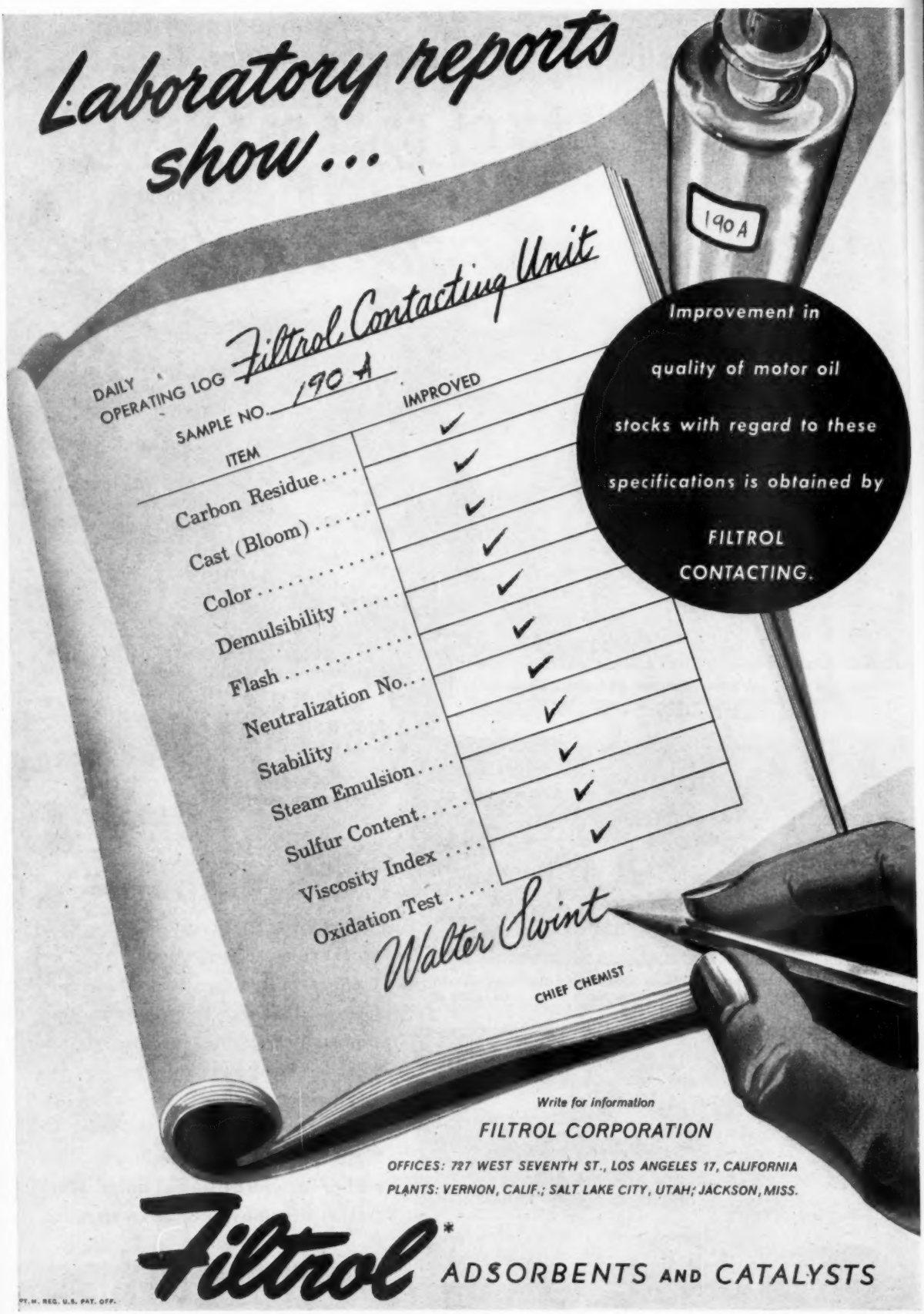
THE GENERAL L.C.M.

THE GENERAL H.C.T.

When jobs call for off and on-the-road work you can make more profit on General's dual-purpose team. The General L. C. M. gives you more traction, more flotation, more strength and wear for most work off-the-road. The General H. C. T.'s deep, saw-tooth, free-rolling tread ribs run safely at high speed over-the-highway. More rubber for more original miles. More carcass strength for more recap miles.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

Laboratory reports show...



Improvement in quality of motor oil stocks with regard to these specifications is obtained by FILTROL CONTACTING.

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Filtrol* ADSORBENTS AND CATALYSTS

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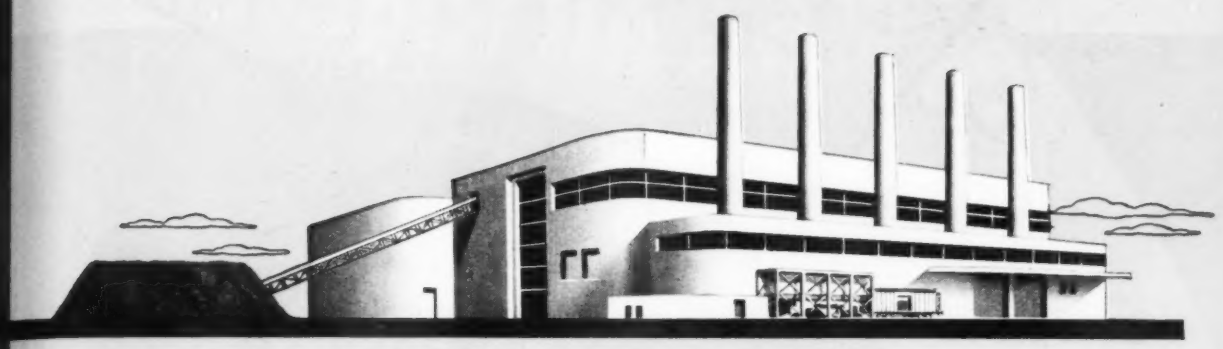

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3,400,000 kw

of Central Station Capacity

has been fabricated and erected by*

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Since **1945**

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If It's All-Cameron It's All Right!

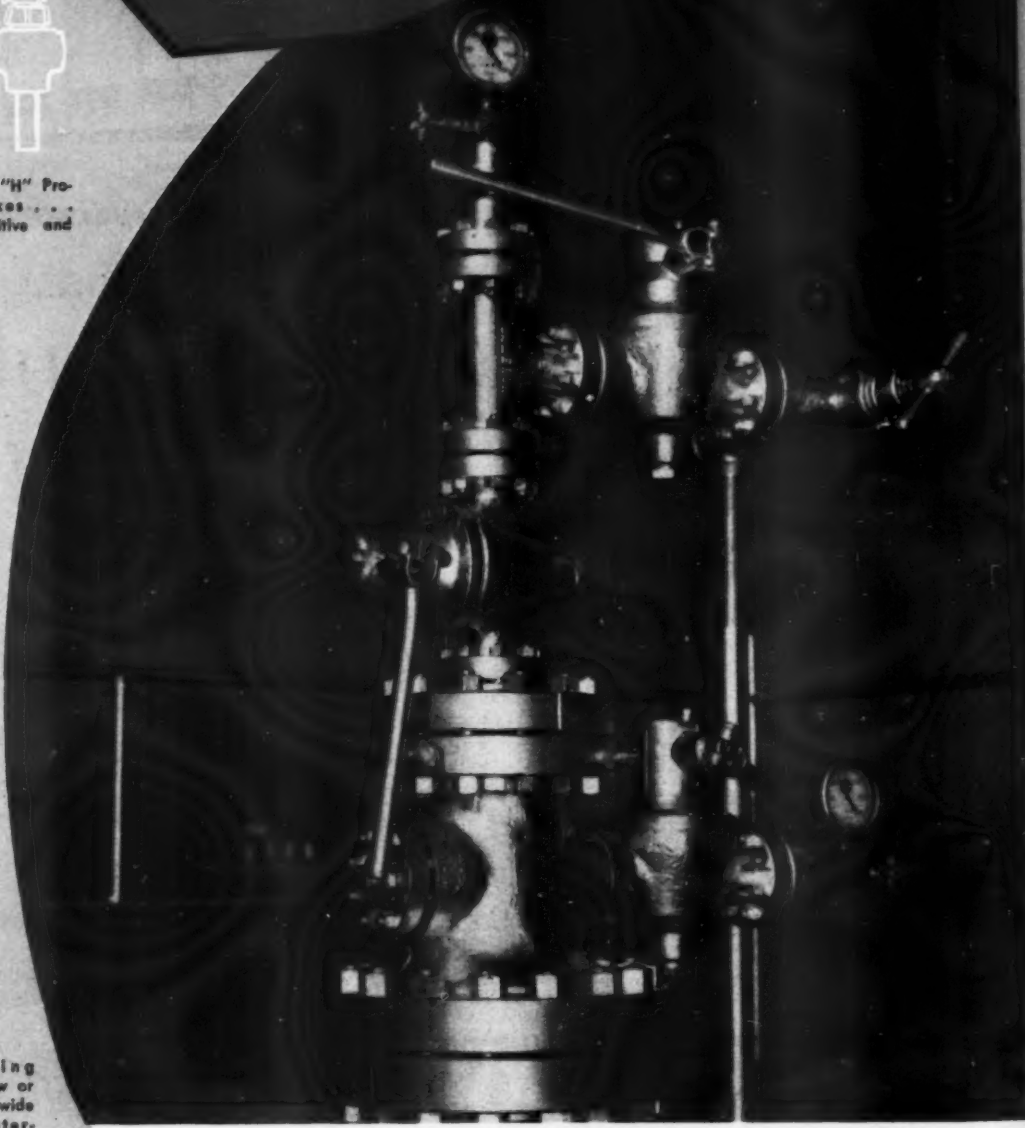
Cameron Type "H" Production Chokes . . . convertible positive and adjustable.

Cameron Non-Lubricated Lift Plug Valves . . . . combining the best features of gate and plug valves, with exclusive Cameron innovations.

Cameron Fittings . . . tees, crosses, adaptors, spools—everything required to round out your tree.

Cameron Tubing Heads, lock screw or ram type, with a wide selection of interchangeable hangers.

Cameron Casing Heads and Spools . . . with proven hangers and seals to best meet your requirements.



Instead of assembling your Christmas tree from various manufacturers' products, and thus dividing the responsibility for its proper functioning and servicing, **why not go all the way with Cameron?** Since the introduction of the Non-Lubricated Lift Plug Valve, which has enabled Cameron to offer the industry Christmas trees assembled entirely from Cameron products, many operators, sensing the advantage of this undivided responsibility, have standardized on the **ALL-CAMERON** tree.

CAMERON IRON WORKS, INC.

P. O. BOX 1212 • HOUSTON, TEXAS

EXPORT: 74 Trinity Place, New York

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Don't buy a V-Belt Drive unless—

1. the sheave comes in two parts for easy mounting—separately or as one-piece assembly[a]

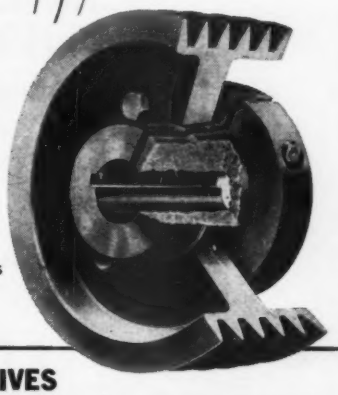
2. the hub and rim are "taper-mated", for friction cone grip and positive press fit on shaft[b]

3. the clamped hub holds shaft position when rim size is changed—no realignment problem[a]

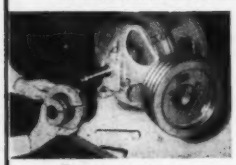
4. I-beam spokes on driven sheave help carry heavier load with less weight[a]

5. the belt carries the load with minimum internal friction[c]

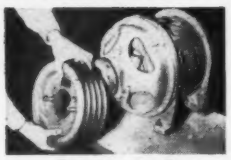
a Worthington exclusive
b Worthington original
c Worthington-Goodyear original—endless load-carrying cords in neutral axis



WORTHINGTON MULTI-V-DRIVES



Easy to get on

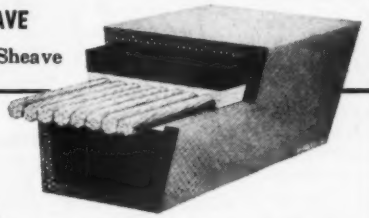


Easy to get off

Yet always tight on the shaft

WORTHINGTON QD SHEAVE

Original Tapered Cone-Grip Sheave



WORTHINGTON-GOODYEAR EC CORD V-BELTS

Each endless cord carries an equal share of the belt load—each belt, matched and uniform in length, carries an equal share of the drive load.

Send coupon for latest Worthington QD Sheave bulletin, V1400B7F

Complete Range of QD Stock Sizes— Prompt Shipment 853 listed stock sizes in "A", "B", "C", and "D" sections fhp to 600 hp... 332 listed stock sizes of EC Cord V-belts.

It was a crisis that occurs only on Saturday mornings

Minutes before noon on a Saturday morning, a frantic call to **Oberjuerge Rubber Distributing Co.**, St. Louis, Mo. reported a motor failure at a brickyard.

A week's stoppage of production was threatened.

A different motor was available, but not the right rpm.

Could Oberjuerge furnish belts and sheaves to give the proper speed? Answer (after some quick calculations): yes—two Worthington QD Sheaves, 8 groove, 16 in. driver, 58 in. driven, with a set of 8 Worthington-Goodyear V-Belts.

By mid-afternoon, the brickyard was back in production. Again, a Worthington distributor had saved the day—or, in this case, a week!

WORTHINGTON

ORIGINATORS OF THE QD SHEAVE

WORTHINGTON PUMP AND MACHINERY CORPORATION
MULTI-V-DRIVE SALES DIVISION
Buffalo, N. Y. • *General Offices:* Harrison, N. J.

POWER TRANSMISSION: sheaves, V-belts, variable speed drives
PUMPS: centrifugal, power, rotary, steam
AIR COMPRESSORS: water-cooled, air-cooled

The Good Right Hand of Industry

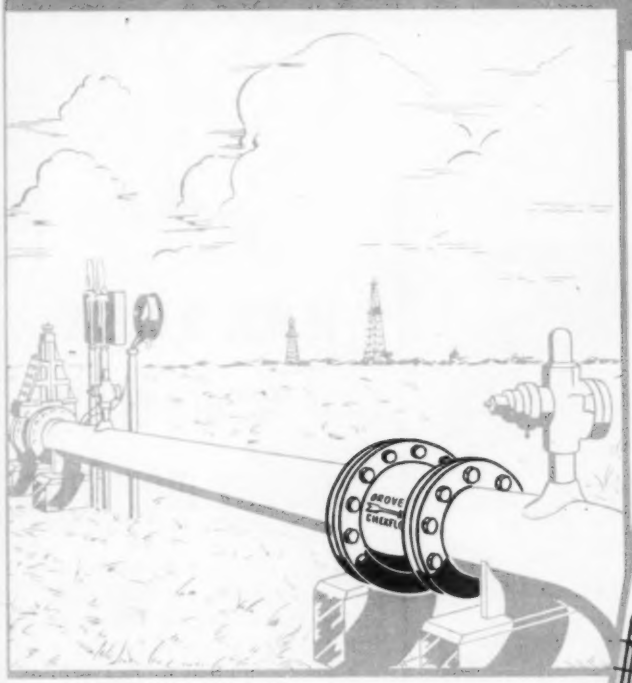
Worthington Pump and Machinery Corp.
Multi-V-Drive Sales Division,
Buffalo, New York

Send Bulletin V1400B7F on Worthington Multi-V-Drives.

Name.....
Company.....
Address.....
City.....Zone....State.....

XUM

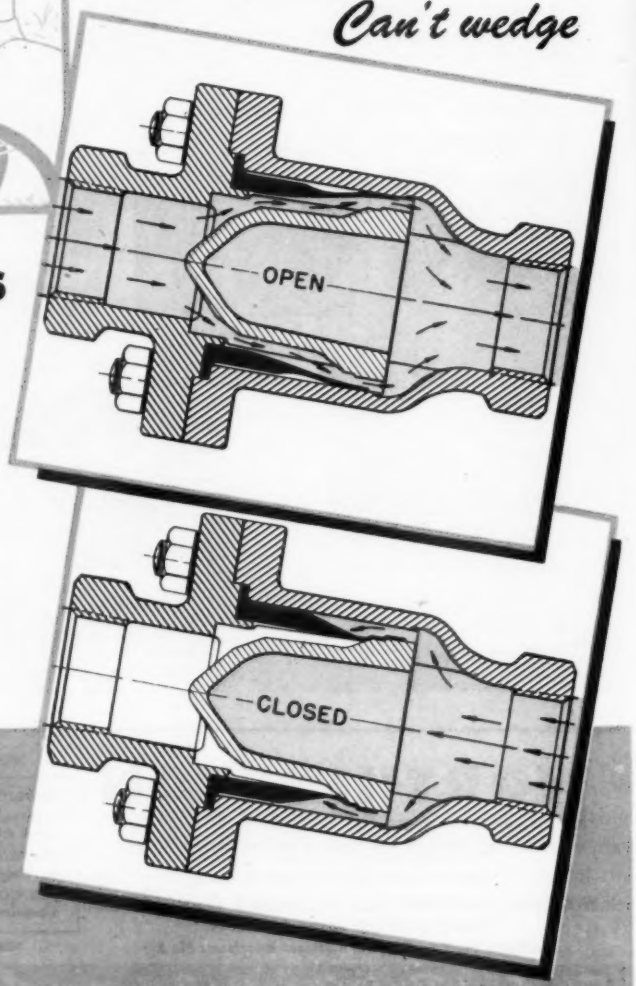
GROVE ChexFlo CHECK VALVES



ON METER RUNS

positive operation
leak-proof seal
no moving metal parts
full-flow capacity
minimum pressure drop

Can't stick
Can't slam
Can't wedge



ChexFlo NEVER FAILS TO OPEN OR CLOSE

The only moving part in the Grove ChexFlo Valve is a tough Buna N tube which fits tightly around a stationary metal core. In operation, only a fraction of a pound pressure is required to stretch the thin lip of the tube off the core, opening the valve with minimum pressure drop. The flow, streaming past the core, holds the rubber tube in the open position. When flow stops, the tube constricts shut around the core, closing tightly before the start of return flow. Reverse flow squeezes the tube more tightly on the core, making a seal which becomes tighter with increasing pressure. Specify Grove ChexFlo on your Meter Runs. Write for full information on the check valve that never fails to open or close. ***Grove "T" Valves on Meter Manifolds complete this efficient installation.***

GROVE REGULATOR COMPANY

1901 CALUMET ST., HOUSTON, TEXAS
6529 HOLLIS ST., OAKLAND, CALIF.
1930 W. OLYMPIC BLVD., LOS ANGELES, CALIF.

Cotter Pins don't grow on Cacti!

SUPPLY STORES SERVE YOU WHEREVER THERE IS OIL!

PETROLEUM EQUIPMENT SUPPLIERS MEMBER ASSOCIATION

. . . . but EVERYTHING you NEED is within easy reach in the OIL FIELDS!!

When oil-play gets under way, even in a remote and desolate area, the driller can move in with complete confidence that he will have easily available any and all types of equipment and supplies for all emergencies. He knows this from experience . . . that fast-moving and reliable organizations of the members of the Petroleum Equipment Suppliers Association will be there with inventories worth millions of dollars . . . everything from complete rigs to cotter pins, as well as Cummins Dependable Diesels and all repair elements. The Petroleum Equipment Suppliers deserve your support and patronage for the quality of the service they are giving.

CUMMINS DEPENDABLE DIESELS . . . THROUGH YOUR SUPPLY STORES

CUMMINS Diesel POWER

CUMMINS
Sales & Service, Inc.

General Offices: FORT WORTH, TEXAS

TEN CUMMINS DIESEL FACTORY-TYPE REPAIR BRANCHES WHERE TRAINED EXPERTS GIVE 24-HOUR SERVICE

How and Where?

...Ross answers today's 2 big questions about heat exchangers

As all of us get deeper and deeper into the defense program, the questions "how" and "where" will obviously become more important and more frequent.

Today's the time, we think, to give you *our* answer to these vital questions, with respect to heat exchanger procurement. And we aim to make it a helpful answer . . . one that will accomplish the most good for all of us.

HERE'S WHAT WE CAN PROMISE . . . *DEFINITELY!* Ross can take over *your* problems *faster* . . . saving much of *your* time. As the pioneer and most advanced in heat exchanger standardization, Ross has the engineering know-how and the plant facilities to get your job going *sooner* . . . the knowledge and the skill to do it *better!* This applies to all types of heat transfer and allied equipment—exchangers, surface condensers, steam jet vacuum equipment—either fabricated from stock parts and standardized designs, or specially engineered from the ground up. And it applies to every phase of today's domestic and military needs—chemicals • plastics • power • synthetic rubber • powder • petroleum • metals—the same as it applies to fighting vessels • cargo ships • trucks—

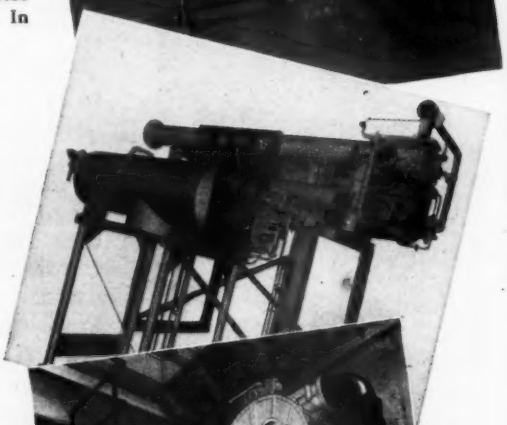
Yes, our answer to "how" and "where" is "HERE"! For, no matter what your problem or application, Ross is a ready source of time-saving methods.

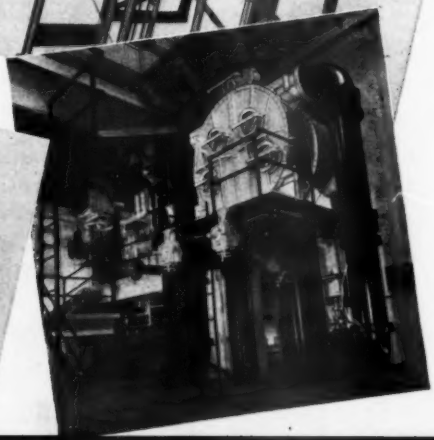
ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corp., 1417 West Avenue, Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

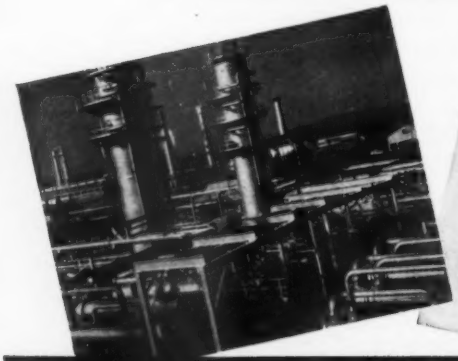
BUILT TO T. E. M. A. STANDARDS As a member of the Tubular Exchanger Manufacturers Assn., Ross fabricates in accordance with the published thermal and mechanical standards of T. E. M. A.

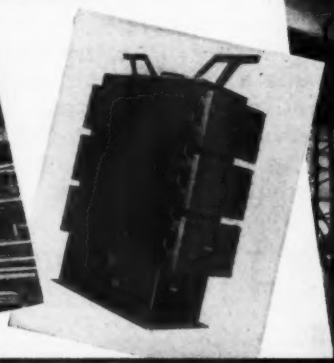
ROSS

EXCHANGERS









Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT FABRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Lufkin engine brings up the oil... TIMKEN® bearings bring down the cost

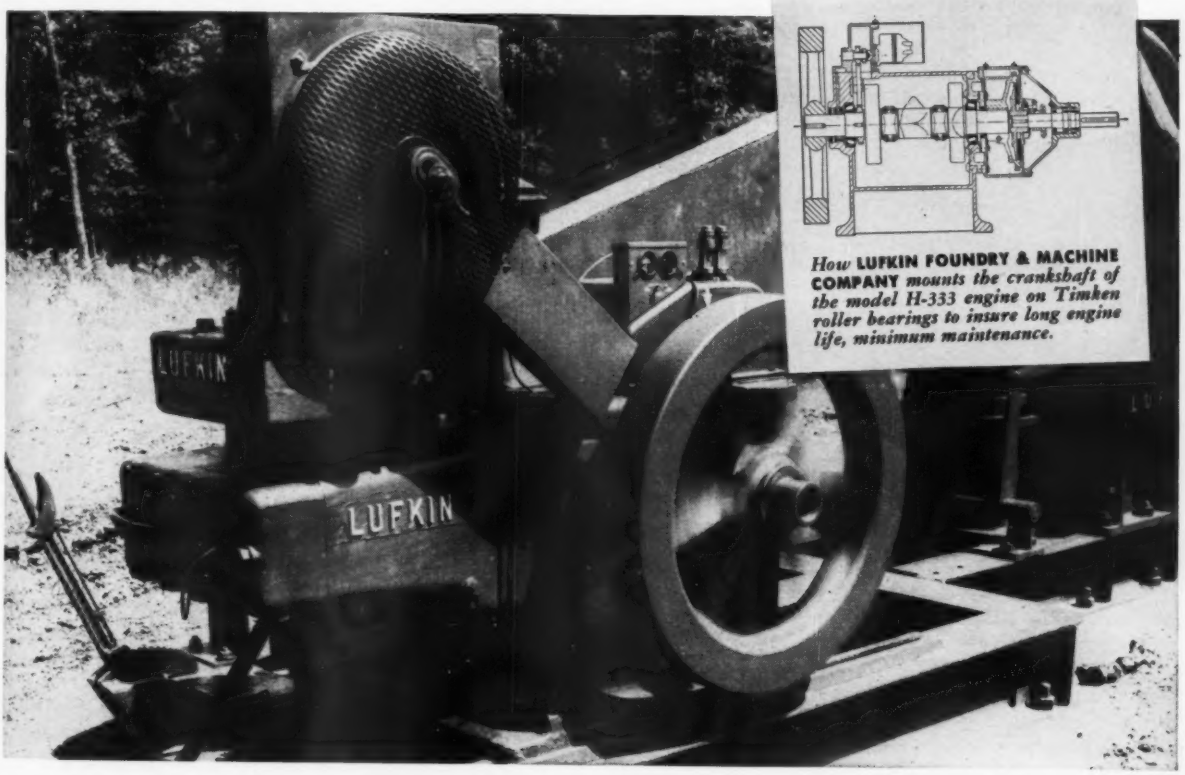
LOW maintenance cost and continuous, uninterrupted operation are important factors in keeping down the cost of bringing up oil. That's why the Lufkin Foundry & Machine Company has mounted the crankshaft and clutch shaft of its Model H-333 oil field engine on Timken® tapered roller bearings. With Timken bearings on these vital parts, operators get dependable pumping month after month, with minimum maintenance.

Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel. The tough inner core of the bearings easily absorbs the terrific explosion pressures while their hard wear resistant surfaces normally enable them to last the life of the engine. Timken bearings hold crankshaft and clutch shaft in proper alignment. Excessive wear on moving parts is eliminated.

Due to their tapered construction, Timken bearings carry both radial and thrust loads in any combination—without deflection or end-movement. Line contact between rollers and races gives extra load-carrying capacity. Manufactured to extreme precision and finished to incredible smoothness, Timken bearings make friction practically negligible.

Backed by 50 years of bearing research and development, Timken bearings are first choice throughout industry. No other bearing can give you all the advantages you get with Timken bearings. Be sure to look for the trade-mark "Timken" on every bearing you buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **LUFKIN FOUNDRY & MACHINE COMPANY** *mounts the crankshaft of the model H-333 engine on Timken roller bearings to insure long engine life, minimum maintenance.*

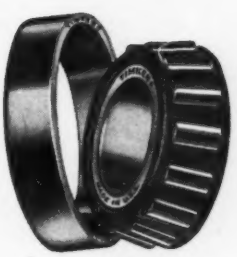
NEW ENGINEERING JOURNAL!

529 PAGES! Includes new, technical information on bearing applications available nowhere else. Especially helpful to design engineers. Gives bearing dimensions, capacities, selection and mounting data. For a copy, write on your company letterhead to The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

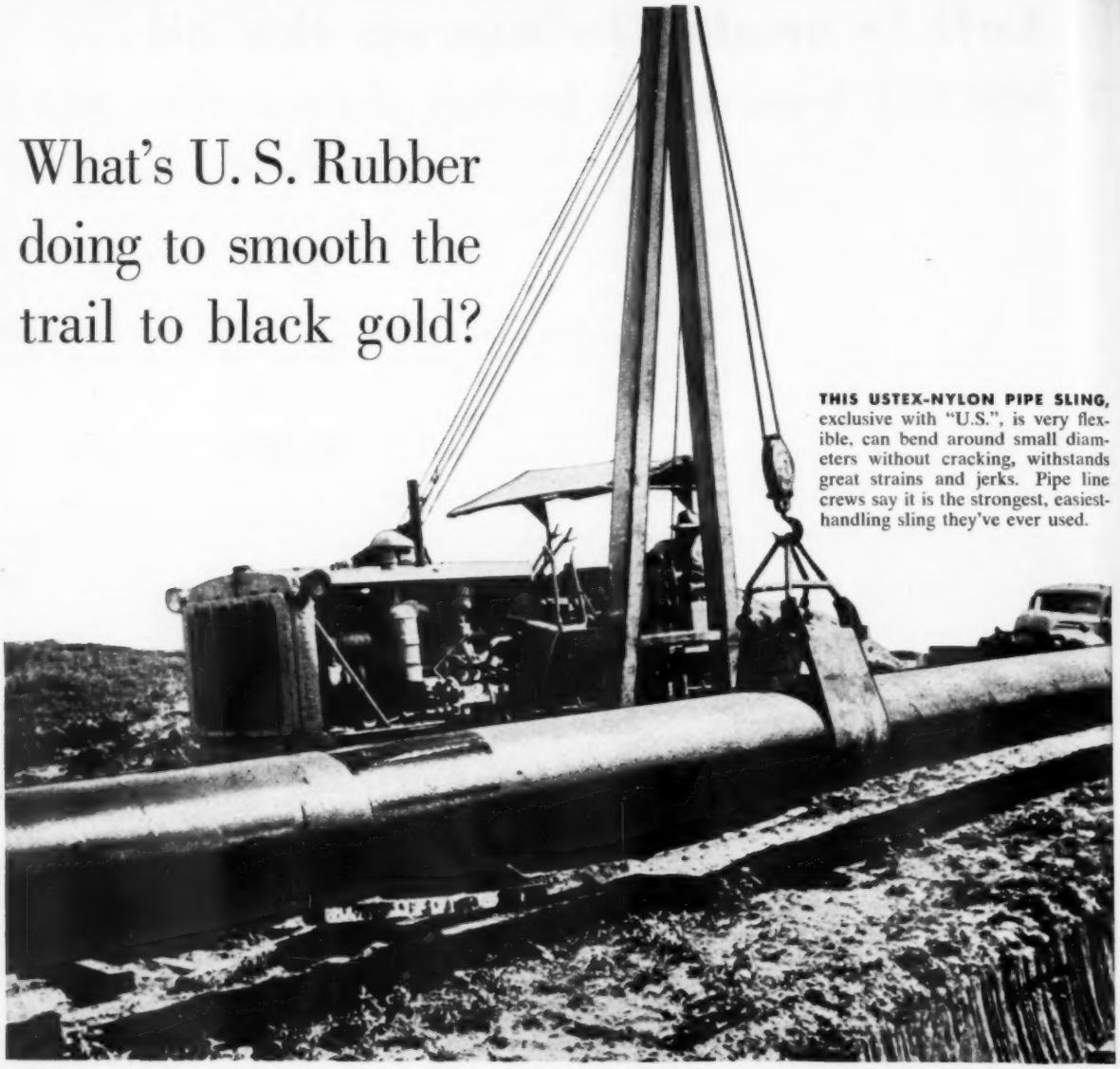
TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST ←◎→ LOADS OR ANY COMBINATION

XUM

What's U. S. Rubber doing to smooth the trail to black gold?



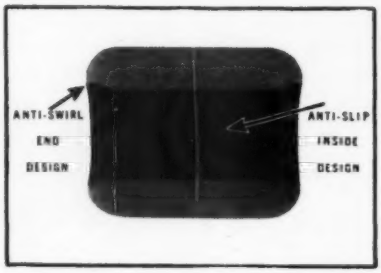
THIS USTEX-NYLON PIPE SLING, exclusive with "U.S.", is very flexible, can bend around small diameters without cracking, withstands great strains and jerks. Pipe line crews say it is the strongest, easiest-handling sling they've ever used.

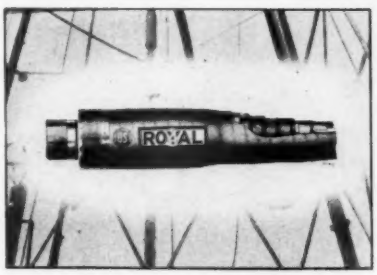
Shutdowns become more frequent and more serious, if reliable equipment, designed to handle these *new* problems, is not available. "U. S." experts are always ready with products that fill the new specifications required by today's progressive oil men.

You can cut costs, avoid delays by specifying U. S. Rubber Products for the oil field. "U. S." oil specialists and engineers are always ready to help you on specialized problems. Write to address below:

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

THIS NEW PIPE WIPER is reversible, molded in one piece with double wiping lips. Does the work of two old-style wipers, yet costs no more than the single type. Easily cut to pipe size. Individual wipers have handled over 315,000 feet (nearly 60 miles) of piping.





RUGGED U.S. ROYAL 4 ROTARY HOSE is so powerful that it need not be replaced by steel hose when high pump pressures are required. No excessive straining or kinking, because it is built for mousehole connections.

UNITED STATES RUBBER COMPANY

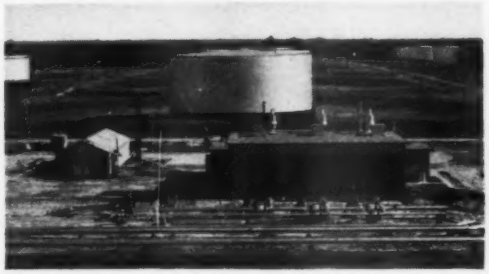
MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Here's real pumping power for Pipe Lines

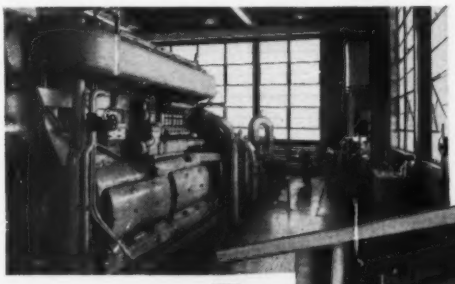
ALCO Diesel engine pumping installation at Patoka Station of The Texas-Empire Pipe Line Company System uses NO spare units.

Operation of these Alco diesels is so reliable that the Patoka Illinois Station uses no spare units—and yet must be ready at all times to pump vital crude oil by pipe line to refineries and connecting carriers. That's why Alco medium speed Diesels have been picked for the job. These dependable engines have operated 96% of the elapsed time at 94% of the manufacturer's rating, using centrifuged line crude for fuel. Operation is so reliable that the station uses no spare units. Such dependable performance is the chief reason why in the last ten years *more Alco Diesels have been installed in oil pipe line pumping service in the U. S. and Canada than any others.* For more details check now with American Locomotive Company, 30 Church Street, New York 7, or the nearest Alco Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady, St. Louis.

Outside view Patoka Pumping Station



Close-up view of one of the Alco Diesels at Patoka



Three Alco Diesels pumping crude at Patoka

SPEED Vs. WEAR

Remember, since piston speed and journal travel per minute are both almost the same in medium speed and slow speed engines, wear is equivalent as well. Not only do you get unequalled dependability with Alco Diesels—you get long wear and low maintenance costs, no matter how difficult the service conditions.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY

DRILLING CONTRACTORS

Happy Brings You Another "FIRST"

BWH

Rotocured V-Belts

HAPPY — the buy-word in OIL FIELD TRANSMISSION for more than 30 years — now brings DRILLING CONTRACTORS the full value of its experience in tough belting problems . . . with the EXCLUSIVE BWH ROTOCURED V-BELTS. ROTOCURE is the process of continuous vulcanization developed and patented by BWH which insures UNIFORM CURE, UNIFORM STRETCH and eliminates Weak Spots or overcured sections in the belt.

The MUD PUMP on the drilling rig illustrated is driven by twelve D 480 HAPPY BULLDOG V-BELTS. Because these belts have been cured by this exclusive BWH Rotocure Process, this WEST TEXAS DRILLING CONTRACTOR has 24 hour assurance against down time due to belt failure . . . will get longer life . . . lower maintenance cost.

Consult your nearest Happy Company office on HAPPY BULLDOG V-BELTS or write direct to Boston Woven Hose & Rubber Company.

Here you see V-Belts being cured by the BWH ROTOCURE PROCESS. ROTOCURING GIVES YOU THESE ADVANTAGES: (1) Assures longer Flex-life; (2) No Mechanical Distortion of Belt; (3) Constant UNIFORM Stretch throughout entire length of V-Belt.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

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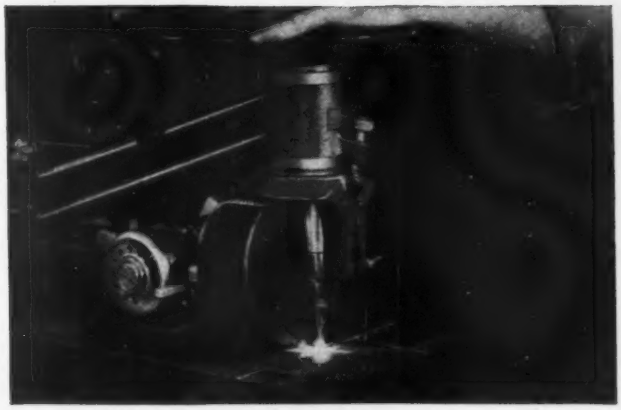
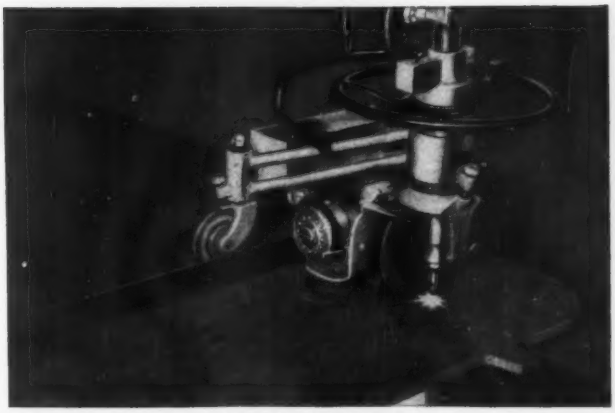
Industrial Hose Rubber Belting V-Belt Sheaves
V-Belts Power Transmission Equipment

PARTS UNLIMITED

. . . *in Jig Time*



Cuts Irregular Shapes



Cuts Straight Lines

Cuts Circles

In large and small shops alike, the OXWELD CM-16 Portable Cutting Machine fills an unbelievably wide variety of oxygen cutting requirements. It cuts circles automatically. Hand-guided, it cuts irregular shapes. Operated on track, it cuts straight lines.

Indoors or out—wherever steel needs shaping—the CM-16 makes it easy to "tailor" parts as fast as the work can be laid out. *And its ready adaptability for special jobs is limited only by its operator's ingenuity!*

The CM-16 sets up as quickly as any manual outfit. It weighs only 45 lb., travels directly on the work, and is easy to carry from job to job. In normal use, it cuts up to 4 in. of steel; with standard accessories, it cuts materials up to 18 in. thick and it cuts bevels.

Any LINDE representative will be glad to show you how the OXWELD CM-16 Portable Cutting Machine can boost production and cut fabricating costs in your shop. Write for catalog, Form 4487, or call the LINDE Office nearest you today for a free demonstration.

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

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A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

Oxweld Trade-Mark **CM-16 PORTABLE CUTTING MACHINE**

XUM

List 25—Rising Stem, Solid Wedge, Iron Gate Valve.
List 58½—(Short face to face). Rising Stem, Low Pressure, Double Disc Iron Gate Valve.
CHAPMAN

Check CHAPMAN First

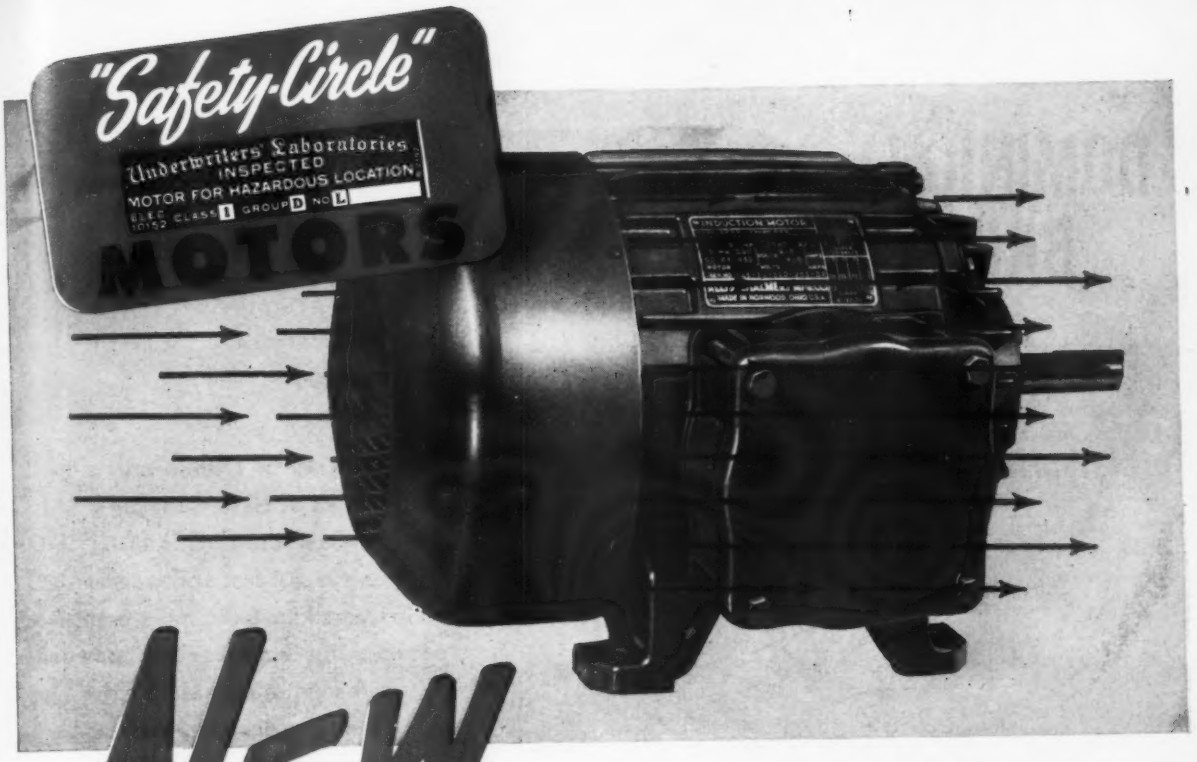
when you need Standard Valves

Next time you are in the market for standard valves, contact Chapman *first*. In this complete line, you'll find a valve for practically every purpose . . . every pressure . . . every size requirement.

For instance, there are iron gate valves in both double disc and solid wedge types in a complete range of sizes . . . and for a complete range of working pressures from 25 to 800 lbs. for steam, water, oil or gas service. Operation may be by electric motor, hydraulic or pneumatic cylinder, floor stand or hand wheel (with or without bevel or spur gearing).

In addition, there's a complete line of steel valves along with valves of many types including tilting disc check and standard check valves. Also, where special valves for unusual service are required, Chapman engineers will be glad to help you develop them.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASS.



NEW Easy to Clean Resists Corrosion

CORROSIVE ATMOSPHERES CAN'T HURT this Allis-Chalmers Type APZZ explosion-proof motor because major parts are enclosed in a rigid cast iron frame! No extra treatment is needed and cast iron's corrosion resistance won't chip off.

Lower Maintenance, Too

No corners, pockets or hidden air passages to collect dirt. Cleaning is the simplest of maintenance operations. Just blow the dirt off the outside of the motor with an air hose. Fan and housing design keep cooling air-flow tight against the yoke so dirt does not accumulate and cleaning is seldom required.

Factory Lubricated Bearings

Bearings are lubricated at the factory and should need no attention for years. Extra rigidity of the cast iron frame holds bearings in alignment under all operating conditions. This gives long bearing life and low operating costs.

Get All The Facts

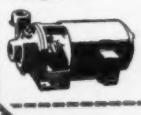
The new *Safety Circle* explosion-proof motor is built in NEMA standard frame sizes from 224* to 505. Call your nearest Allis-Chalmers Authorized Dealer or Sales Office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletin 51B6144. A-3264

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.



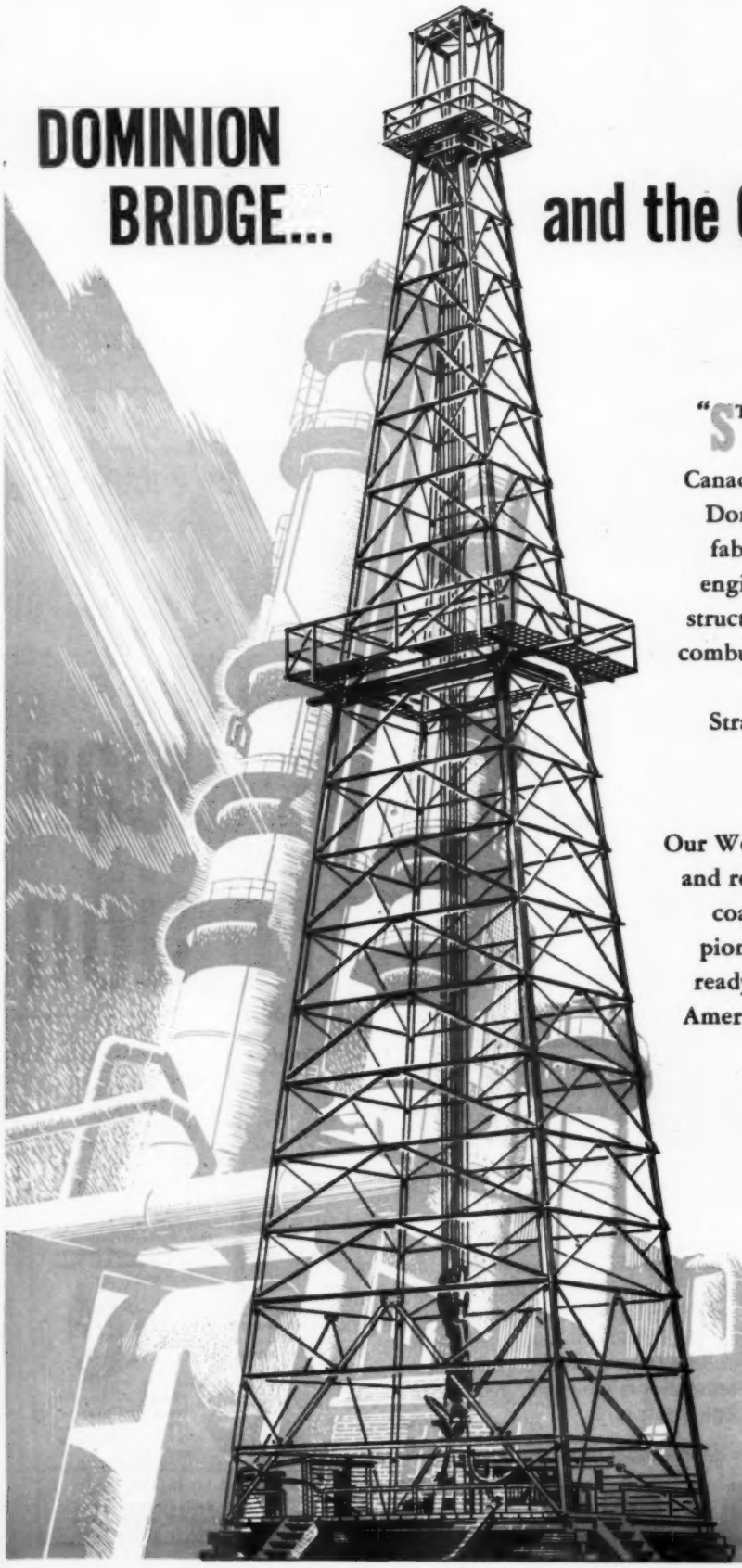
PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Safety Circle, *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors, Type APKK, also available in frames 203 to 224 inclusive.

DOMINION BRIDGE... and the OIL INDUSTRY



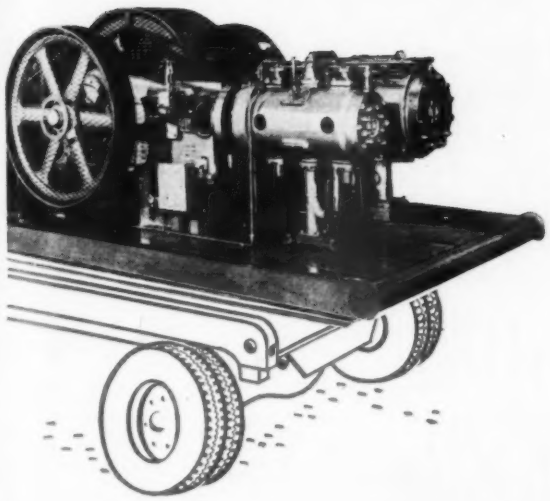
"STEELWORK by Dominion Bridge" is a byword in Canada—and in Canada's expanding oil industry. The Dominion's oldest and largest steel fabricators have the most complete engineering facilities for platework, structural steel, mechanical work and combustion engineering, serving both refineries and field operations. Strategically placed warehouses are also available for the supply of plain steel requirements.

Our Western plants have been enlarged and re-equipped. Backed by a coast to coast organization with 68 years of pioneering and research—they stand ready to meet the challenge of North America's great new oil development.

Plants at: Vancouver, Calgary, Winnipeg, Toronto, Ottawa, Montreal.
Assoc. Companies: Edmonton, Sault Ste. Marie, Quebec, Amherst.

PLATEWORK DIVISION *
DOMINION BRIDGE
COMPANY LIMITED

*Write to Box 280, Montreal, for fully illustrated booklet SB-1.



Truck 'em in and Hook 'em up!

Gardner-Denver Booster Compressors are compact, skid-mounted units — built within road limits for fast trucking to location.

They're completely assembled units — ready to hook up and go — are easily disconnected and moved as your field conditions change.

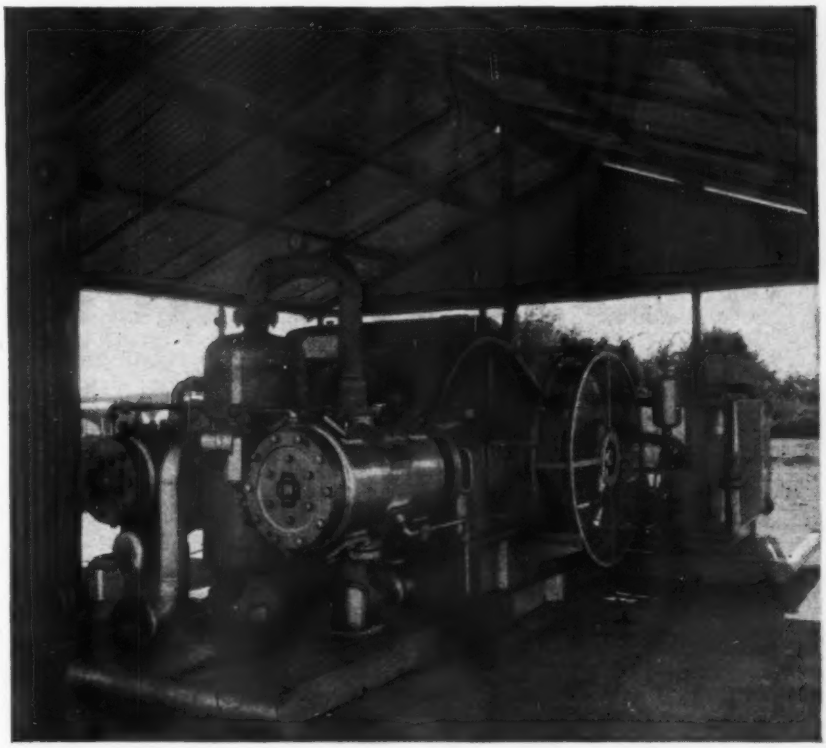
Install them anywhere in the field — wherever you need a continuous and dependable compressor unit. Famous Gardner-Denver quality features — plus automatic safety controls — assure full load service — day and night — without pampering.

A Size to Meet Your Needs . . .

Complete Gardner-Denver compressor units are available in a wide range of capacities and pressures for booster service, re-pressuring or air-gas lift. Single-stage or two-stage outfits can be furnished with any type of drive, in sizes from 5 to 275 h.p.

Write us for complete details, or call your nearest Gardner-Denver office for expert help in choosing the correct outfit for your field conditions.

Gardner-Denver 8 & 4¾ x 11 RX Two-Stage Booster Compressor



Since 1859

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Gardner-Denver Company, Quincy, Illinois

In Canada:

Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

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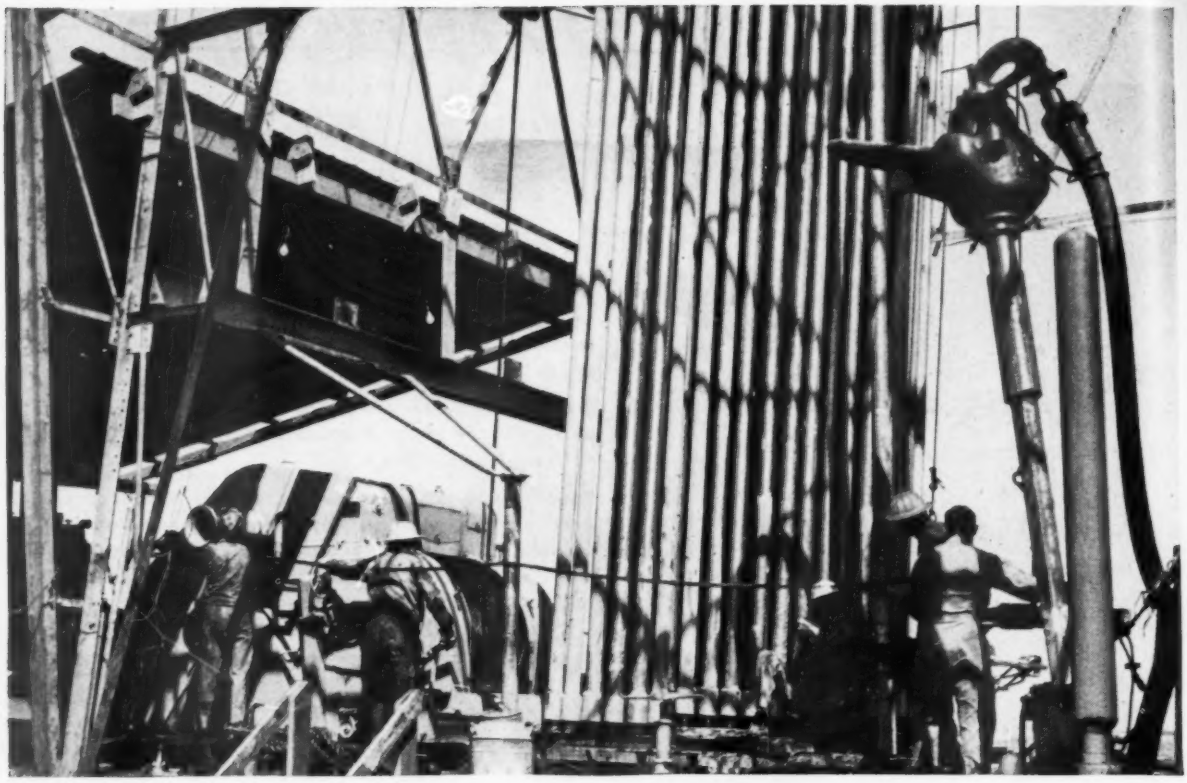

When There's No Time For "Lost-Time"

...It Pays to Use ALLOY STEELS!

With more oil urgently needed...with equipment in constant use . . . the danger of breakdowns is a matter of vital concern. Now, more than ever, it pays to use alloy steel working parts in drilling equipment.

Republic alloy steels are tougher and stronger than carbon steels. They offer greater resistance to abrasion—and better withstand the stresses and strains encountered in deep drilling operations. They respond uniformly to heat treatment and produce hard, wear-resisting surfaces. The extra toughness, the extra strength, the extra stamina of alloy steels is good insurance against lost operating time and revenue because of parts failure.

The 3-Dimensional Metallurgical Service of Republic—world's largest producer of alloy and stainless steels—is at your service, free of charge. Field, mill and laboratory metallurgists are ready to help you properly apply alloy steels to your specific needs.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
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REPUBLIC STEEL

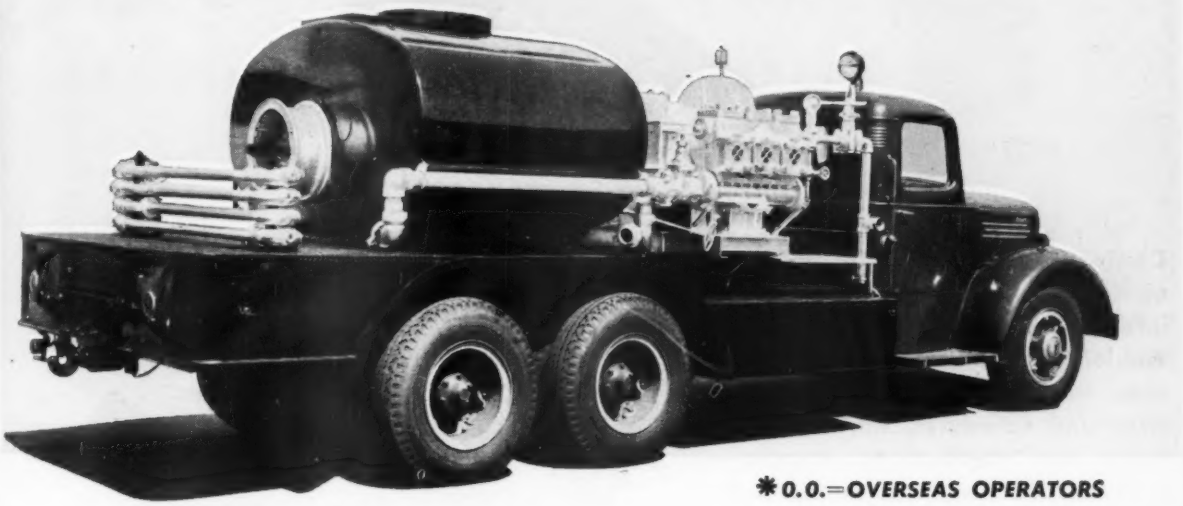
Republic **ALLOY STEELS**

Other Republic Products include Casing—Tubing—Line Pipe—Upson Studs, Bolts, Nuts and Rivets—Electrunite Boiler Tubes

makes acidizing easy for O.O.*

ICI General Service Pumping Unit handles acid, chemicals, hot and cold oils, and drilling fluids easily and economically

Overseas operators now can speed up and simplify a wide variety of pumping jobs with ICI's General Service Pumping Unit. Originally built for service work in the U.S., this tried and proven unit is now offered for export sale. Write today for prices on this versatile time and money saver.



***O.O.=OVERSEAS OPERATORS**

NOTE THESE FEATURES

PUMP: Triplex plunger type pump. Design provides for easy removal of plungers. Bleeder line is attached for releasing discharge pressures. Throttle, clutch, and pressure gauge, located on deck of truck, provide for convenient operation from this point.

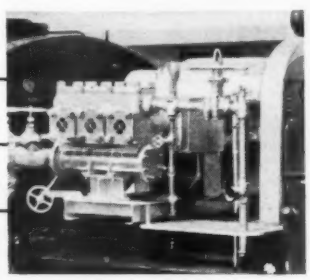
Suction manifolding is flexible. In addition to the line going to the tank, there are two other suction lines. These suction lines can be attached to the pump from barrels, tanks, etc., without disconnecting from the well. Discharge line is equipped with special type valve designed for easy opening and closing under pressure.

TANK: Capacity 1000 gallon or 1500 gallon as desired. The specially designed, rapidly opened and closed manhole provides convenient access to inside of tank or for the easy entry of additive materials to the tank.

POWER UNIT: Choice of truck is optional. May be gas or diesel as required. Pump operates on power take-off from truck engine.

OTHER FEATURES: Provisions are made for storage of all auxiliary fittings. Large tool boxes are built in chassis. Auxiliary steel discharge hoses, equipped with swing joints, are carried in accessible position on back platform. An operating light illuminates the rear deck. 1500 to 2500 gallon trailers are available for use with these units.

Size	4½" x 8"
Max. rpm	125
Max. Pressure	7500 lbs
Max. Discharge rate	200 gpm



INTERNATIONAL CEMENTERS, INC.

6505 Paramount Boulevard, Long Beach 5, California

ICI Oilfield Equipment

International Cementers, Inc., 420 Lexington Avenue, New York, New York, U. S. A.
"T. I. P. S. A." Avenida Rogue Saenz Pena 501, Buenos Aires, Argentina, S. A.

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ANNOUNCING
A BRAND NEW CATALOG
FOR BONNEY WELDOLETS

Contains complete and up-to-the-minute catalog information on all types of Weldolet welding fittings available. Presents a full range of sizes and schedules, introducing many new applications, together with simplified data on the determination of code requirements. To get your copy of this catalog, write . . .

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NATIONAL SUPPLY EXPORT CORP.
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WELDOLETS

WELDING FITTINGS FOR ANY PIPING SERVICE

New WHELAND HP-14000 7½" x 14" Duplex Slush Pump

STEEL OR SEMI-STEEL FLUID END OPTIONAL

350 Horsepower

...AND ALL THE HORSES ARE THERE!

WHELAND TIE RODS. Maximum strength, minimum weight. Tie rods for extra strength are used by leading manufacturers of heavy-duty equipment such as big hydraulic and mechanical presses for forging, stamping, bulldozing. No better method has ever been found to get strength where it is most needed. Wheland uses tie rods because it is the BEST WAY to get EXTRA strength into a pump. You may have seen a lot of pumps broken in the cradle . . . but YOU NEVER SAW A WHELAND TIE ROD PUMP WHICH BROKE AT THE CRADLE.

From discharge pressure of 838 lbs. with 7½" liners to 1627 lbs. with 5½" liners at 60 R.P.M., here is the pump that delivers the mud. Wheland's exclusive power end has the strength to do the job. The fluid end, available in steel or semi-steel, is one of the best liked, best proved designs ever offered the oil driller.

This new Wheland pump is packed with features that mean extra strength, extra smoothness, more accessibility, more flexibility and great DEPENDABILITY. It's your best buy in pumps! Write for bulletin **or**

THE BEST POWER END EVER BUILT

The crank is the guts of any pump and here is the outstanding development . . . EXCLUSIVE WITH WHELAND. Assembled as an integral unit with NO CONNECTING ROD BOLTS. One-piece alloy steel crank on Timken Roller Bearings. Heat treated alloy steel connecting rods fitted to crank on American Roller Bearings. Tool steel helical gear and pinion, specially hardened. Ample size. Ample strength. Quiet. Free of vibration. This WHELAND pump really has the guts to do the job!

Ask the Jones & Laughlin Supply Man

MEMBER PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

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THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.
ROTARY DRILLING MACHINERY

DRAWWORKS • SLUSH PUMPS
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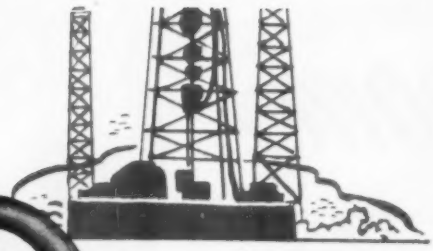
FLEXIBILITY WITH SAFETY



RAY-MAN ROTARY HOSE

"Never thought I'd see a rotary hose so easy to handle and make up on the rig."

That's what a tool pusher says about the super flexibility of Ray-Man Rotary Hose. To his boss, it means longer life for the hose and couplings, because it escapes a lot of damage in handling. It hangs steady in the derrick; cushions pump pulsations. Oil-proof tube permits drilling-in with oil or oil-base mud.

The Built-In Coupling has a leak-proof "Lip-Lok" Seal for extra safety. Specifications are described in Bulletin 6898, mailed on request. Ray-Man Rotary Hose is distributed by National Supply Company in all principal oil fields.

Hose, V-Belts and packing, engineered for all phases of the oil industry, are described in Catalog 6903. Write for your copy.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

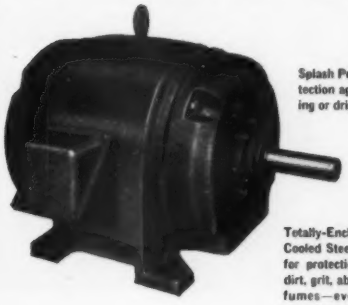
Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

wherever motor hazards prevail...

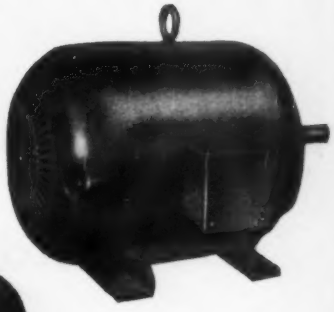
GUARD PRODUCTION WITH Wagner Protected Motors

Do you use motors in locations where dirt, filings, moisture, splashing liquids, explosive gases, acid fumes, or other motor hazards prevail? If you do —no matter how severe the operating condition—Wagner can furnish the *right* motor for your purpose, adequately protected for specialized requirements.

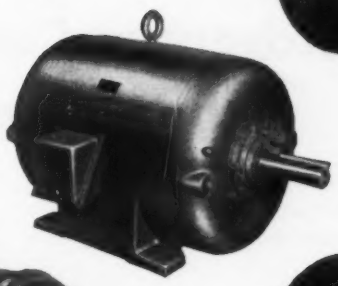
Wagner protected type motors are known for completely dependable operation in their specific applications. They are backed by sixty years of motor building experience. Five protected-type Wagner Motors are shown below. Bulletin MU-185 gives full information . . . write for your copy.



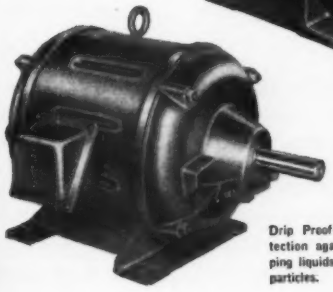
Splash Proof—for protection against splashing or dripping liquids.



Totally-Enclosed Fan-Cooled Steel Frame—for protection against dirt, grit, abrasives, or fumes—even in abnormal quantities.



Totally-Enclosed Fan-Cooled Cast Iron Frame—for protection against corrosion from fumes or moisture.



Drip Proof—for protection against dripping liquids or falling particles.

Explosion Proof—for complete protection in hazardous atmospheres.

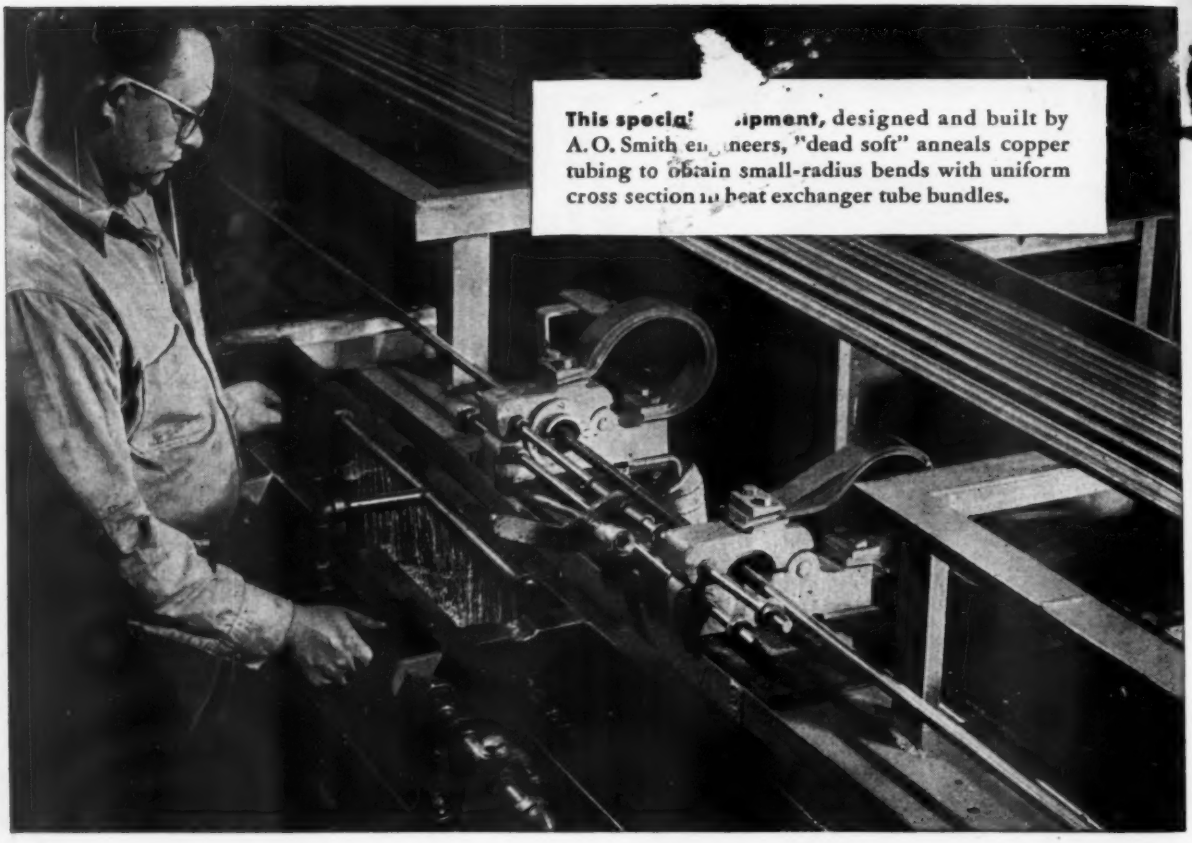
WAGNER ELECTRIC CORPORATION
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

® Wagner Electric Corporation 1891 1951

M51-10



This special equipment, designed and built by A. O. Smith engineers, "dead soft" anneals copper tubing to obtain small-radius bends with uniform cross section in heat exchanger tube bundles.

Heat Exchanger Construction Improved with Unique Equipment

Heat exchangers frequently require special design and construction features for their specific process applications.

A. O. Smith can draw on a 77-year background of experience and some 300 engineers and technicians to solve these special problems.

Here you see an application of electric resistance heating of tube areas to be bent. The immediate advantage is closely controlled zone heating which can be done faster, more uniformly, and with less scaling of the tube, than with some other methods of heating.

Let A. O. Smith design and build your heat exchanger. Take advantage of our extensive experience in thermal design, engineering, metallurgy, welding and fabricating.

Facilities as well as the skill to satisfy your most exacting requirements are here . . . feel free to call on A. O. Smith when confronted with a heat exchanger problem.

77th ANNIVERSARY 1874 1951

A.O.Smith

HEAT EXCHANGERS

Atlanta 3 • Boston 16 • Chicago 4 • Cleveland 15 • Dallas 2
Houston 2 • Los Angeles 12 • New York 17 • Philadelphia 3
Phoenix 2 • Pittsburgh 19 • Salt Lake City 1 • San Diego 1
Seattle 1 • Tulsa 3 • Washington 6, D.C.
International Division: Milwaukee 1

ALL ROPES *look* ALIKE... but THERE'S MORE THAN MEETS THE EYE...

Rope wire viewed under a microscope with 100 magnification and the correct McQuaid-Ehn grid superimposed and matched to the sample for classification.

Yes, all wire ropes *do* look alike...on the outside. But not when you go 100 times beyond the range of normal vision. That's where you find the big difference...because that's where the grain size of the steel shows up.

Steel used for Wickwire Rope is measured for proper grain size by the exacting McQuaid-Ehn test. Typical samples are carburized to 1750° F., cooled slowly, polished and etched; then examined under a high-powered microscope for the proper matching of a McQuaid-Ehn grid to the size of the crystals. Thus, we make sure that steel going into Wickwire Rope conforms to the definite grain size that will give longest, most satisfactory service.

Such quality control of basic properties is possible only with a company like Wickwire...where manufacture is integrated from molten metal to finished rope...where the know-how of 52 years experience goes into the making of every wire rope.

It explains, too, why Wickwire Rope always gives you uniform performance, enduring reliability and longer, more economical service on the job. For the *right* rope for your particular requirements, see your local Wickwire distributor. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed. For your free copy of "Know Your Ropes" write to: Wire Rope Sales Office, Wickwire Spencer Steel Division of C.F.&I., Palmer, Mass.

WICKWIRE ROPE

CF&I & SUBSIDIARIES

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

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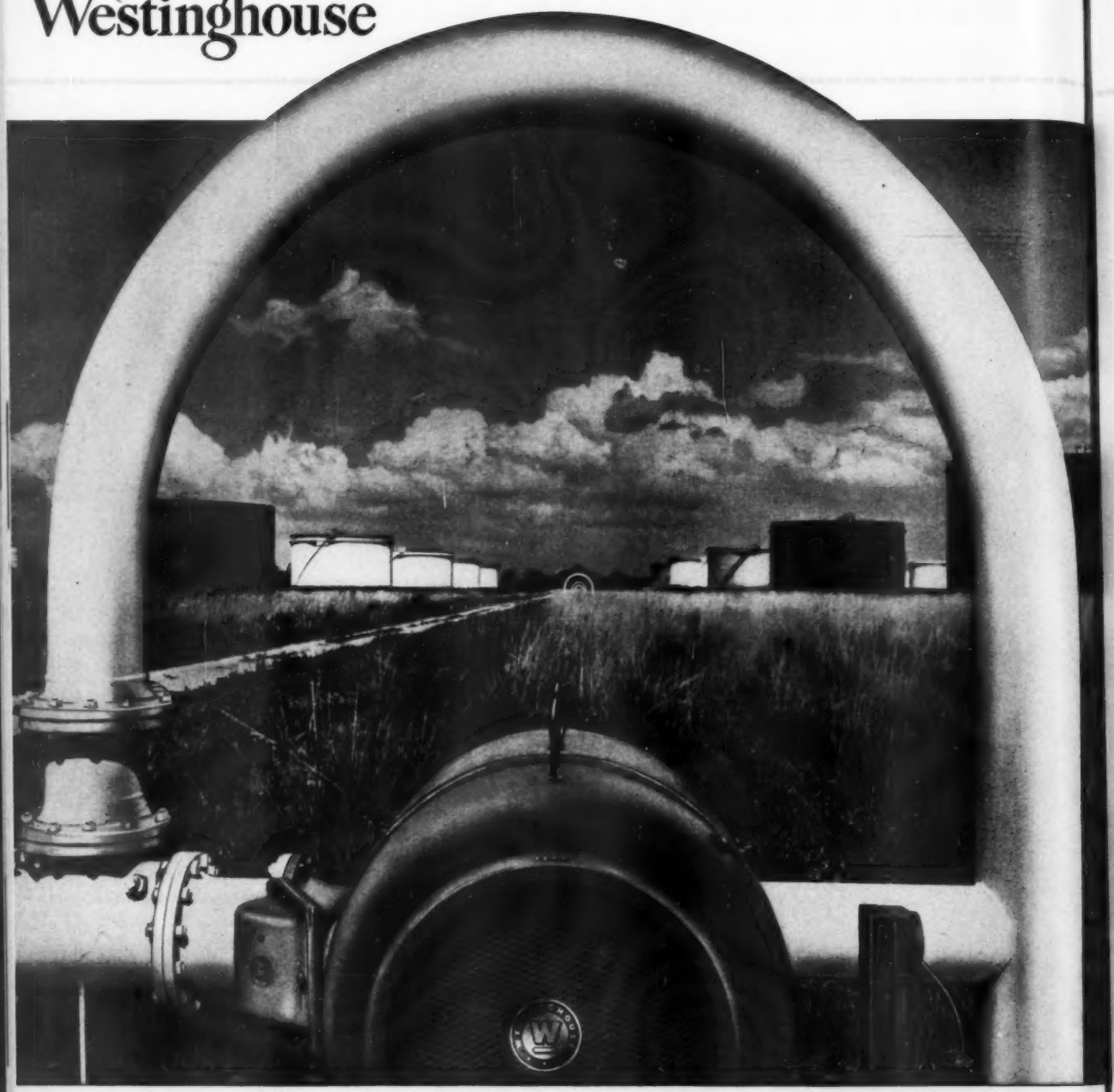
YOU CAN BE **SURE**.. IF IT'S

Westinghouse



WORKING PARTNERS

Power equipment for pipe lines of any size or length, from oil wells to refineries to marketing centers, can be supplied *in entirety* by Westinghouse. Implementing the vital phase of land transportation is but one part of the Westinghouse role of working partner to the petroleum industry. When you want dependable power equipment with undivided responsibility, come to Westinghouse.

Westinghouse

Top Pipe-Line Performance Calls for Co-ordination

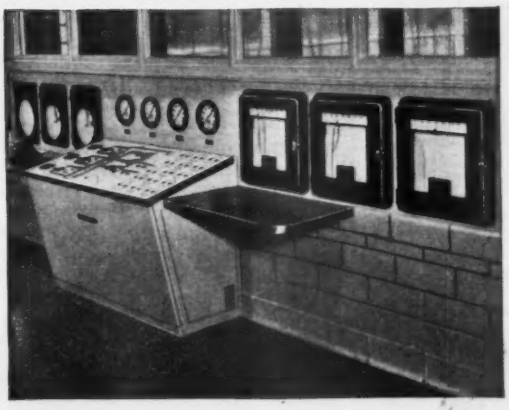
A modern, electrified pipe-line project calls for complete co-ordination of both engineering and equipment. Only in this way can the aims of low investment, low operating cost and uninterrupted performance of the pipeline be fully attained.

Westinghouse can provide this co-ordination. In electrical equipment, we can furnish everything needed, including complete outdoor substations, motors for main-line and auxiliary drives, starting equipment, control desks, motor-driven blowers for ventilation, auxiliary power and lighting distribution and cathodic protection equipment.

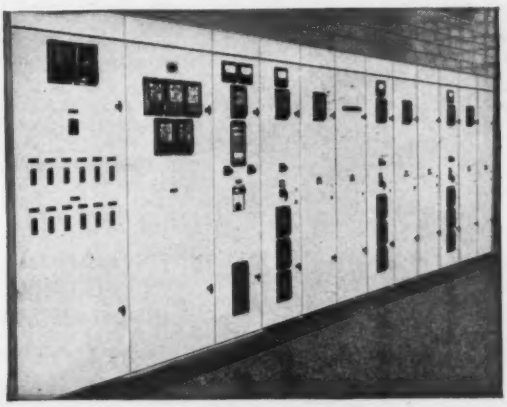
For engine-driven stations, Westinghouse step-up gears provide efficient and reliable transmission of power from engine to pump, permitting each to operate at its most advantageous speed. In such stations we can furnish complete generating, distribution, motor and control equipment to meet the requirements of auxiliary drives.

In service, we can provide engineering facilities based on experience with scores of pipe lines, many of them 100% Westinghouse-equipped. These range from small gathering lines to the largest electrically-driven crude and refined-products pipe lines ever built.

Westinghouse petroleum industry specialists are available to assist you in working out integrated plans. Call your nearest Westinghouse District Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94801



This control desk in a semiautomatic station has flow recorder and controllers for station suction and discharge pressures at left, pushbutton co-ordinated electrical control for pump units and motorized valves in center, with pressure gages on panel above, and protective thermocouple recorders at right.



"Unitized" Metal-Clad Switchgear in a semiautomatic pump station, showing (left to right) low-voltage distribution, sequence control for automatic operation of pump units and valves, control of the outdoor main breaker, and reduced-voltage starting equipment for three main-line pump units.

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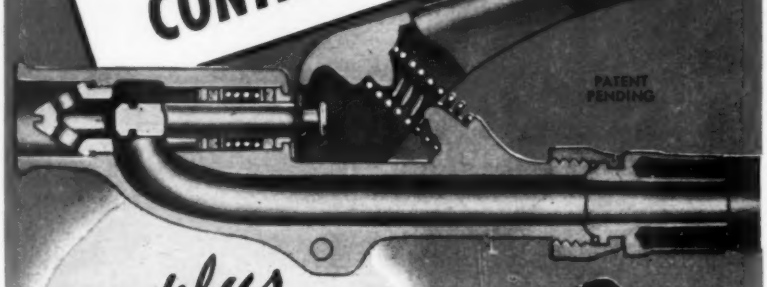
FASTER.. ..MORE EFFECTIVE FIRE CONTROL

WITH THE ANSUL *Stream Pattern*



..plus BETTER HEAT-SHIELD PROTECTION

Exclusive Features

- Water-tight construction.
- Provides a modified cone-shaped stream pattern without hole in the center of the stream.
- Each nozzle gas pressure tested after assembly.
- Special spring loaded packing to insure lasting water-tightness.
- Designed for use by inexperienced operators.
- Low velocity, more effective stream of dry chemical.

Why Advertise the Nozzle! . . . .

. . . . because the **nozzle** on your ANSUL Dry Chemical Fire Extinguisher is **water-tight** . . . it **won't** become inoperative due to corrosion or caking of dry chemical within the working parts . . . the most inexperienced man in your plant **can use the ANSUL extinguisher effectively . . . and only Ansul has a nozzle** to meet all of these requirements!

If your hazards require special long range straight stream nozzles, you can get Ansul Extinguishers equipped with these nozzles at no extra cost. With Ansul Dry Chemical Fire Extinguishing Equipment you have not only the best fire protection but also a choice of models and designs to meet your requirements.

Send for File No. 655. You will receive our latest catalog, a Periodic Inspection Record Chart, "Fundamentals of Fire Extinguishment" and information about Ansul Dry Chemical Piped Systems for automatic protection.

ANSUL

CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION
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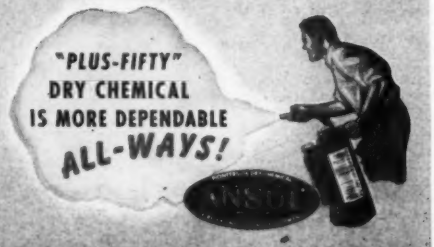
DISTRIBUTORS IN ALL PRINCIPAL CITIES IN THE U.S.A., CANADA AND OTHER COUNTRIES



THIS TRADE MARK ASSURES YOU OF QUALITY PRODUCTS

They Say—

Texas Blows In!

"A large slice of Texas blew into town this week when the valves were turned on in the Manhattan end of the world's largest natural-gas pipe line that starts 1,840 miles away in the Rio Grande Valley. While this is not the first natural gas to get here—Staten Island has had it since 1949—it is the first to arrive in any volume. Before long the metropolitan area east of the Hudson will be receiving more than 250 million cubic feet a day.

"The natural-gas business is like Texas itself—you've got to think and talk big, in terms of millions at least. The nation's gas reserves are at the dizzy heights of 180 trillion cubic feet. The very name of this giant pipe line—Transcontinental—is no exaggeration. Its starting end nuzzles the Mexican border. It cost over $240,000,000 to build and can deliver in a single day more than 550,000,000 cu. ft. of gas—a vast new energy resource opening up at a time of national emergency.

"These heroic dimensions are typical of the booming business of pipe lining, whose steel fingers now extend to every part of the country except the Pacific Northwest. Bunyanesque is the word for it.

—*Editorial in The New York Times.*

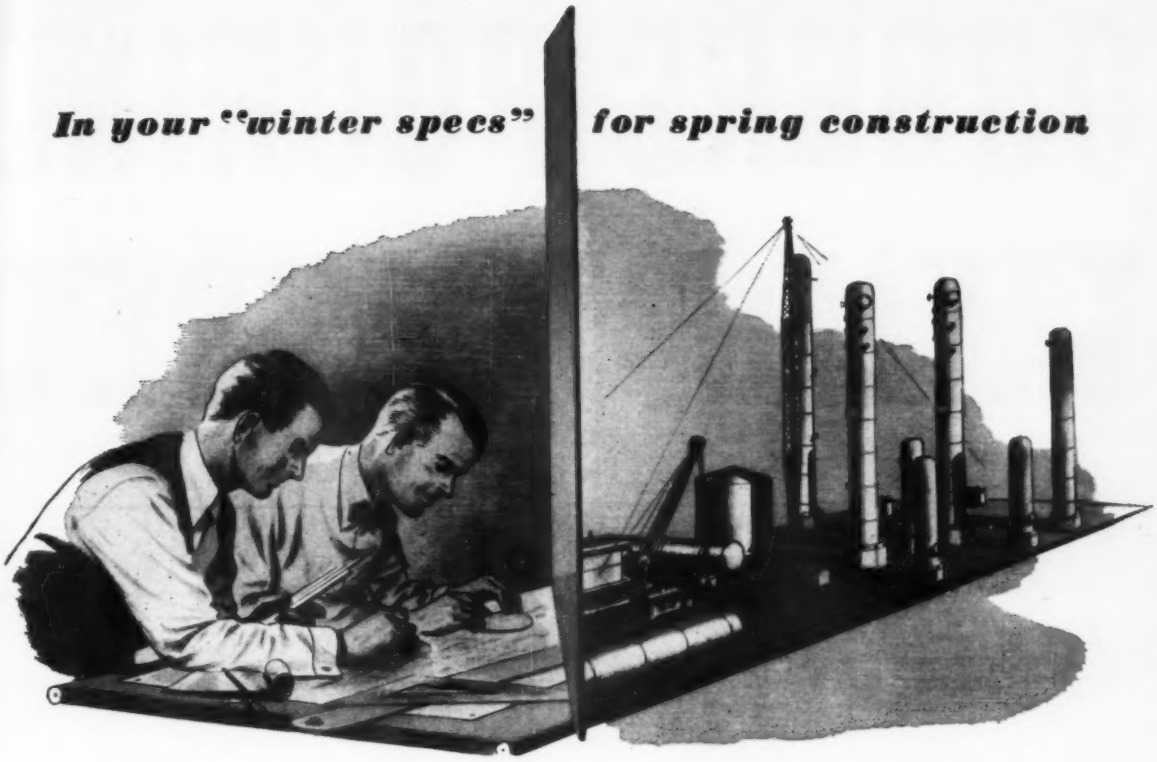
We've Got Plenty of Oil

"Just about a month-and-a-half ago President Truman declared the country to be in a state of national emergency. Since then, very little has happened in the world to lessen either the seriousness or extent of the emergency. The danger to the ideas of freedom and justice for which our country stands has, if anything, increased.

"Now it is true that we have lost ground on the present field of active military battle. But it is not true that, as a nation, we are weakening. On the contrary, in spite of a lamentably late start and some slowness and indecision still on the part of the authorities, our nation's strength is growing every day. Many of our industries, without fanfare, are converting to the production of war materials. Others stand ready to divert as much of their output as may be needed to military use. Even though the job is much bigger, America is much better prepared to produce war supplies today than it was in September 1939—when an earlier national emergency was proclaimed.

"Fortunately, however, we can be assured that we are not going to run

In your "winter specs" for spring construction



It will pay you to consider these four advantages of a Fluor Pulsation Dampening Piping System . . .

1 **Pressure drop calculation based on smoother flow**

2 **Improved gas metering accuracy**

3 **Virtual elimination of piping maintenance**

4 **Consideration of safety records**

The Fluor Pulsation Dampening Piping System is the newest and most practical approach to "pulse-free" piping yet developed. Designed primarily for installation in new construction utilizing piping to handle air, steam, or hydrocarbons at operating pressures ranging from a vacuum to 5,000 psi at any temperature, this Fluor-designed piping system removes objectionable pulse peak pressures caused by the reciprocating action of compressors.

Fluor Pulsation Dampening Piping Systems are *guaranteed* to provide a virtually smooth gas flow with minimum pressure drop. Safety is increased by eliminating vibrational stress on piping, heat exchangers and vessels. Compressor operating efficiency is increased, metering inaccuracies caused by pulsative flow are reduced, and maintenance problems common to conventional piping systems are cut to a minimum.

If you are in the process of drawing up specifications for current or contemplated construction involving compressor piping, it will pay you to write for Fluor Bulletin No. PDS-8501. Or, contact your nearest Fluor Representative for attention to your particular problem.

FLUOR "PACKAGE-TYPE" PULSATION DAMPENERS

Fluor offers two "Package-Type" Pulsation Dampeners for installation in already existing piping systems. The first, a Fundamental Pulsation Dampener alleviates objectionable pulse frequencies contributing to vibration and pulsation of compressor piping. The second, a Higher Frequency Pulsation Dampener, removes the offending pulse frequencies in the higher range and is competitive in cost with muffler or snubber-type devices.

FLUOR

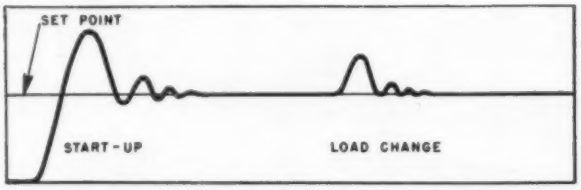
Fluor Pulsation Dampeners and Pulsation Dampening Piping Systems are protected by U. S. and foreign patents issued and pending.

BE SURE WITH FLUOR

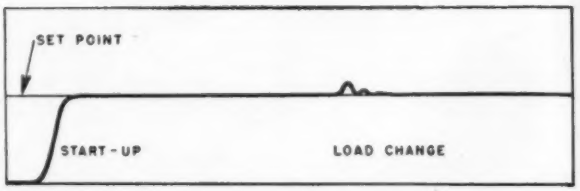
DESIGNERS AND CONSTRUCTORS of Refining, Natural Gas and Chemical Processing Plants.
MANUFACTURERS of Pulsation Dampeners, Mufflers, Gas Cleaners, Cooling Towers and Fin-Fan Units.

THE FLUOR CORPORATION, LTD., 2500 S. Atlantic Blvd., Los Angeles 22, Calif. Offices in principal cities in the U.S.A.
REPRESENTED IN THE STERLING AREAS BY: Head Wrightson Processes Ltd., Teesdale House, Baltic St., London, E.C.I., England

ORDERS POURING I
TAYLOR TRANSET* C



(A) Process curve obtained by Conventional Controller with Automatic Reset.



(B) Result produced by TRANSET TRI-ACT Controller under same conditions as "A".

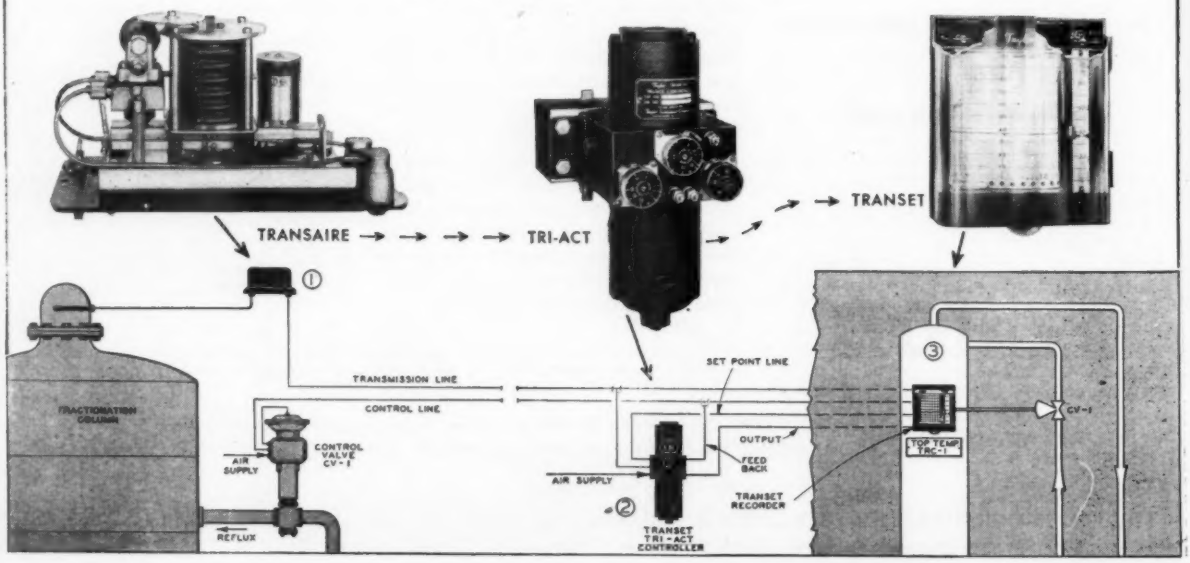
If you want to eliminate overpeaking on start-up... If you want to reduce the effect of load changes—

You ought to have at least one of these systems on test so that you'll know from first-hand experience how this new control circuit takes the evils out of Automatic Reset and gives the benefits of Rate Action with *stability*.

If you are engineering any new process, call in Taylor *right now*. Because with this new System you can specify the exact quality of control you want in advance. Components of the System can be put together like building blocks to meet final plant needs.

TAYLOR TRANSET CONTROL SYSTEM

A New Concept in Pneumatic Control



IN FOR THE NEW CONTROL SYSTEM

New Concept in Pneumatic Control is talk of Industry

NEARLY everyone in the industry is talking about the benefits of the new Taylor TRANSET Control System. Orders are literally pouring into Rochester. This new concept in pneumatic control, which gives unbelievably close control under adverse operating conditions, is a great contribution to all process industries. In almost any process, it will result in a higher yield of top quality product at lower cost.

The Taylor TRANSET Control System combines: **(1)** TRANSAIRE*, the force-balance temperature or pressure transmitters which have created new standards in measuring dynamic, or changing, temperatures and pressures. (The System works equally well with all types of transmitters.) **(2)** TRI-ACT*, the Controller which combines a wider range of response adjustments, an increased capacity relay air valve, and a new control circuit, to take advantage of the faster measuring systems. Can be locally or panel mounted. **(3)** TRANSET Recording Receiver, fits 3⅞" x 4½" panel opening, gives continuous 30-day chart record with 3 hours visible—especially adaptable to graphic panels. Other equally important features are: remote settings of control point, automatic-to-manual control, and instant check on controller performance and control valve position. Also available as an indicator.

Ask your Taylor Field Engineer or write to Taylor Instrument Companies, Rochester, N.Y., or Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

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HERE'S HOW YOU BENEFIT:

1—*More Accurate Measurement*
2—*Closer Control on Any Process*
3—*Higher Processing Efficiency*
4—*Start-Up With No Overpeaking*
5—*Faster Recovery On Load Changes*
6—*30-Day Chart Record On 4⅜" x 5" Panel Space*
7—*Permits Specifying Instrumentation Before Finalizing Process Design Details.*

SEND FOR:

ASME Paper #50-A-100. It tells the theory of TRI-ACT Control.

Taylor Bulletin 98097. It gives details of design and construction.

*Trade-Mark

Taylor Instruments
MEAN
ACCURACY FIRST
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Big steel Mill saves:

6 hours of down time plus 12 man-hours on each routine roller-journal overhaul

using Snap-on* IMPACT SOCKETS and EXTENSIONS

Saving six hours of production time of a hot-broach unit in one of the largest mid-west steel mills undoubtedly earns enough money to buy many a set of Snap-on Heavy-Duty Impact Sockets!

Add 12 man-hours of skilled maintenance mechanics' time and you've got a savings total to gladden the heart of any cost-worried works manager.

This job demands removal of 16 bolts on each roller. For years it's been a slow, sledge-wrench job, averaging 8 hours apiece for two workers. Today, using a 1½" drive impact gun, with Snap-on Impact Sockets and Extensions, the job is done in 4 hours.

Such savings are frequent among Snap-on users. Snap-on's nation-wide tool service—backed by 30 years' experience in tooling every type of industry for production, assembly and maintenance operations—is your assurance of the best obtainable tools for your needs. Write for catalogs and address of nearest Snap-on branch.

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out of oil. In this country, and in the world at large, there is plenty of oil—discovered and yet to be discovered—to supply all our needs for generations to come.

"At present, in the United States, we are using oil at the rate of well over 2¼ billion barrels a year. We have, in this country, estimated proved reserves of about 25 billion barrels. . . .

"Proved underground reserves in the United States are now at an all-time high, despite successive yearly increases in withdrawals of oil from our oil fields.

"We in the oil industry know . . . that many more billions of barrels of oil will be discovered in this country."

—M. J. Rathbone, director, Standard Oil Co. (N.J.), New York City, in a speech before the Summit Rotary Club.

CALENDAR

1951

February

American Institute of Mining and Metallurgical Engineers, annual meeting, Jefferson and Statler hotels, St. Louis, February 19-22.

Kentucky Petroleum Marketers Association, annual meeting and trade show, Brown Hotel, Louisville, February 20-21.

Kansas-Oklahoma Water Flood Operators, monthly meeting, Booth Hotel, Independence, Kans., February 21.

National Association of Corrosion Engineers, Tulsa Section, Short Course on Practical Control of Pipe-Line Corrosion, Mayo Hotel, February 21-23.

Missouri School of Mines and Metallurgy, water-flooding symposium, Rolla, Mo., February 23.

Iowa Independent Oil Jobbers' Association, Inc., annual convention, Hotel Fort Des Moines, Des Moines, February 21-22.

Wisconsin Petroleum Association, annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 27-28.

San Joaquin Valley Oil Producers Association, annual meeting, Bakersfield Inn, Bakersfield, Calif., February 28.

March

American Association of Petroleum Geologists, Rocky Mountain Section, Shirley Savoy Hotel, Denver, March 1-2.

New York Oil Heating Association, Inc., Hotel Statler, New York, March 5.

American Society for Testing Materials, spring meeting and committee week, Cincinnati, March 5-9.

American Petroleum Institute, division of production, southwestern district meeting, Hotel Beaumont, Beaumont, Tex., March 7-9.

Indiana Independent Petroleum Association, spring convention and refiners and suppliers exhibit, Hotel Severin, Indianapolis, March 8-9.

Texas Oil Jobbers Association, Inc., spring convention and refiners and suppliers exhibit, Shamrock Hotel, Houston, March 9-10.

Mid-West Gas Association, Hotel Fontenelle, Omaha, March 12-14.

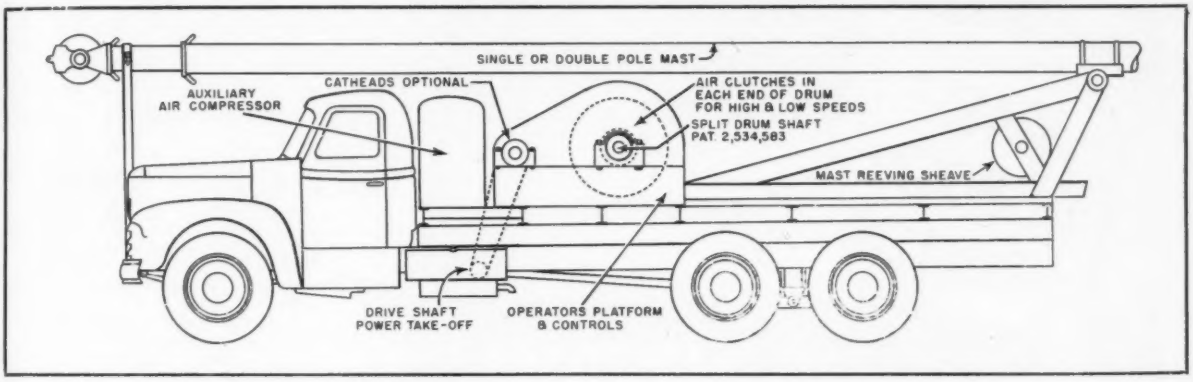
First South American Oil Congress, Montevideo, Uruguay, March 12-16.

Illinois Petroleum Marketers Association, annual convention, Sherman Hotel, Chicago, March 13-15.

National Association of Corrosion Engi-

M.I.W.

TRUCK MOUNTED—AIR OPERATED
SERVICING UNITS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MAST REEVING SHEAVE
DRIVE SHAFT POWER TAKE-OFF
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MODEL P36S

- 18 Brake Blocks 8"x¾"x12"
- 8"x36" Brake Flanges
- 14¾" Dia. Barrel
- 16" Dia. Barrel With Lagging
- 2-Plate 24" Disc Type Air Clutches Both High & Low Sides
- 30,000 lbs. Single Line Pull
- Line Capacity: 7500 ft. ⅝" Dia. 2800 ft. 1" Dia.
- 5" Dia. Heat Treated Alloy Steel Drumshaft

MODEL P42S

- 22 Brake Blocks 8"x1"x12"
- 8"x42" Brake Flanges
- 14¾" Dia. Barrel
- 16" Dia. Barrel With Lagging
- 2-plate 24" Air Clutch on High
- 3-plate 24" Air Clutch on Low
- 40,000 lbs. Single Line Pull
- Line Capacity: 11,200 ft. ⅝" Dia. 4100 ft. 1" Dia.
- 5¼" Dia. Heat Treated Alloy Steel Drum Shaft

OPTIONAL EXTRAS

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- Drum Divider
- Grooved Lagging
- Stinger
- Catheads

By Use of the Patented Split Drum Shaft, We Have the Most Ideal Design in That It Allows More Spooling Capacity and Is Absolutely Free Rolling While Reversing.

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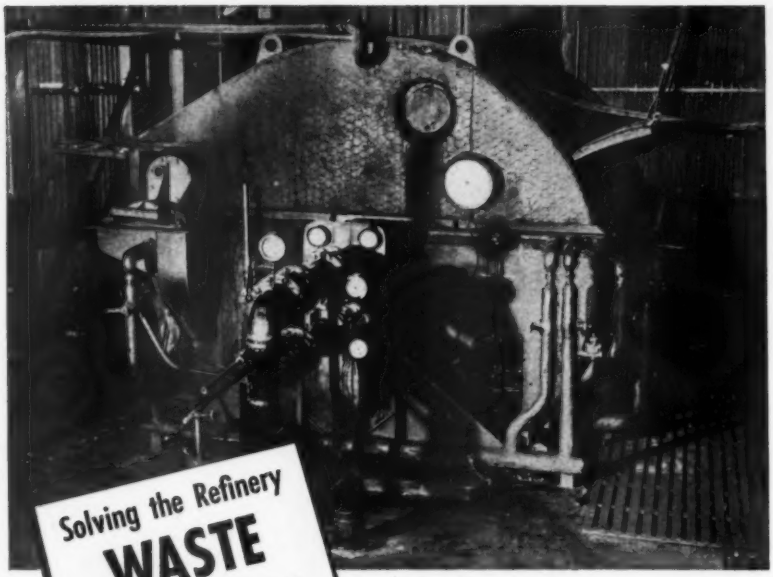

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WASTE DISPOSAL PROBLEM
. . . automatically, economically!

OLIVER PRECOAT FILTER

Trap residues—separator box emulsions—sludges . . . the Oliver Precoat Filter can effectively handle these wastes by dewatering sludges and breaking oil-water emulsions, resulting in stocks for refinery re-run and water ready for disposal in public streams. For example, a refinery is obtaining an oil phase carrying only 2/10 of 1% sludge and only a trace of water; the water phase is comparatively oil-free.

Oliver United engineers, calling on their 42 years of filtration experience and their many varieties of filter types, developed this closed type, continuous vacuum precoat filter for handling refinery wastes. It's proving a boon to refineries in connection with this vexing problem.

A letter or phone call to our nearest office will have a skilled refinery filtration engineer at your plant whenever desired to make a study and recommendations for a filtration plant to handle the wastes properly.

• • •

Another very profitable use of the Oliver Precoat Filter in refineries is in connection with contact clay handling. Many are in service providing continuous handling, great reduction in oil losses over other methods, and more easily handled cake.

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neers, annual conference and exhibition, Statler Hotel, New York City, March 13-16.

Gas Appliance Manufacturers Association, annual meeting, The Homestead, Hot Springs, Va., March 19-21.

Ohio Petroleum Marketers Association, annual convention and marketing exposition, Deshler-Wallick Hotel, Columbus, Ohio, March 20-22.

American Petroleum Institute, division of production, Mid-Continent district spring meeting, Herring Hotel, Amarillo, March 21-23.

North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex., March 24.

Texas Independent Producers and Royalty Owners Association, fifth annual meeting, Beaumont, Tex., March 27-28.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 29-30.

April

American Gas Association, industrial and commercial gas section, conference on industrial and commercial gas, Shoreham Hotel, Washington, D. C., April 2-4.

American Society of Mechanical Engineers, spring meeting, Atlanta, April 2-5.

Oil-Heat Institute of America, annual convention and National Oil-Heat Exposition, Navy Pier and Palmer House, Chicago, April 2-6.

Instrument Society of America, New Jersey section, Essex House, Newark, N. J., April 3.

American Petroleum Institute, division of production, Eastern district meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 3-5.

Midwest Power Conference, fourteenth annual meeting, Sherman Hotel, Chicago, April 4-6.

New York Oil Heating Association, Inc., Hotel Statler, New York, April 9.

Mid-West Regional Gas Sales Conference, Edgewater Beach Hotel, Chicago, April 9-11.

Michigan Petroleum Association, annual spring convention, Detroit Leland Hotel, Detroit, April 10-11.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 10-12.

American Institute of Electrical Engineers, District 4 meeting, McFadden-Deauville Hotel, Miami, April 11-13.

American Gas Association, distribution, motor vehicle, and corrosion conference, Hotel Peabody, Memphis, April 16-18.

American Society of Lubrication Engineers, annual convention and lubrication show, Bellevue-Stratford Hotel, Philadelphia, April 16-18.

National Petroleum Association, Hotel Cleveland, Cleveland, April 18-20.

American Petroleum Institute, Rocky Mountain district spring meeting, Gladstone Hotel, Casper, Wyo., April 19-20.

Brussels International Fair, twenty-fifth annual event, Brussels, Belgium, April 21-May 6.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, joint annual meeting, Jefferson Hotel, St. Louis, April 23-26.

Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

Interstate Oil Compact Commission, spring meeting, La Fonda Hotel, Santa Fe, N. M., April 26-28.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, division of refining, sixteenth mid-year meeting, Mayo Hotel, Tulsa, April 30-May 3.

Materials Handling Conference, Interna-

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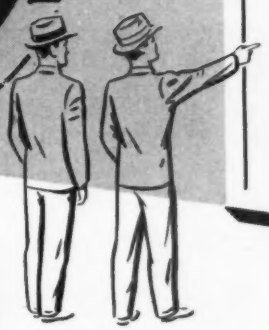

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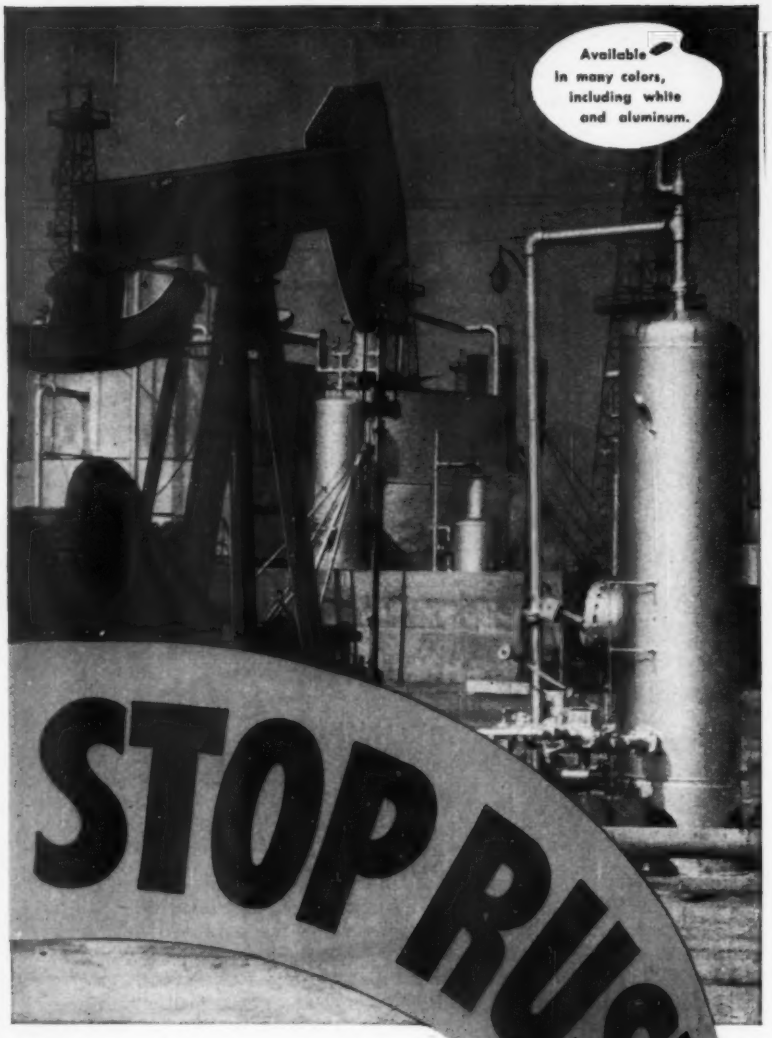

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tional Amphitheatre, Chicago, April 30-May 4.

May

American Institute of Electrical Engineers, District 1 meeting, Hotel Syracuse, Syracuse N. Y., May 2-4.

New York Oil Heating Association, Inc., Hotel Statler, New York, May 7.

American Gas Association, Natural-Gas Department, Dallas, May 7-8.

Independent Petroleum Association of America, mid-year directors' meeting, Cosmopolitan Hotel, Denver, May 7-8.

Gas Appliance Manufacturers Association, natural-gas department spring meeting, Dallas, May 7-9.

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 7-10.

American Petroleum Institute, division of production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

American Institute of Electrical Engineers, District 5 meeting, Loraine Hotel, Madison, Wis., May 17-19.

Empire State Petroleum Association, Inc., Hotel Statler, Buffalo, N. Y., May 20-22.

American Petroleum Institute, division of marketing, mid-year meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, division of production, mid-year meeting, Brown Palace Hotel, Denver, May 28-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

American Institute of Electrical Engineers, summer general meeting, Royal York Hotel, Toronto, June 25-29.

August

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

NOMADS

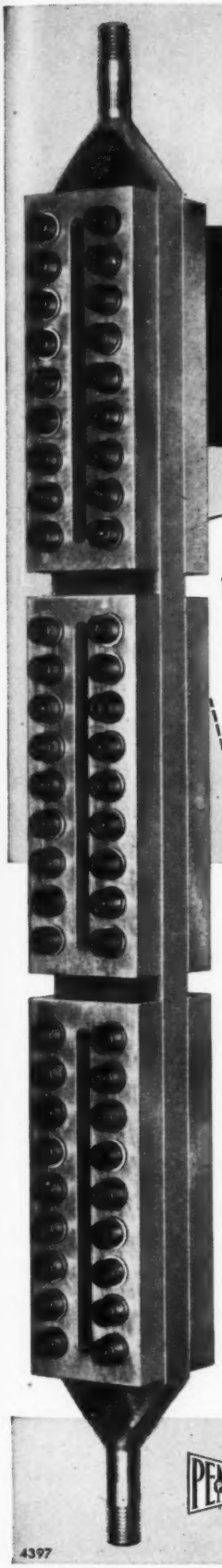
Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, first Monday of each month, Louis Sherry's, 300 Park Ave.



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These gages were developed by Penberthy in answer to persistent demands from the process industries and various laboratories for a gage with UNOBSTRUCTED VISIBILITY at service pressure ratings up to 10,000 psi. They are tested to 15,000 psi. Temperature rating is 250° F dry gas . . . 300° F wet gas.

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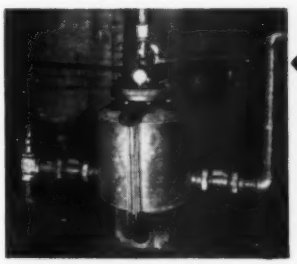

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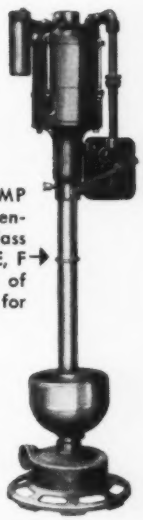
PENBERTHY EJECTORS. A simple jet pump operated by air, water or steam. Needs no lubrication . . . will not get out of order. Ask for Bulletin 5080.



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JOURNALLY Speaking

Eating on Industry

THIS bunch of youngsters won't grow up believing that all oil men are heartless money grabbers. If it hadn't been for a group of southern California oil men they never would have a chance to camp in the high Sierras.

They and a couple of hundred others got the chance last summer because of a hobby of R. M. Pyles, general superintendent of Southwest Exploration Co., Huntington Beach. Bob Pyles' hobby is helping underprivileged children. He rode the hobby so hard that he has been joined by a group of friends, all in the oil business, who help maintain the camp. The kids are selected by various social agencies, and the $50 each it takes to keep one in camp 8 days is contributed by oil men all over the state.

We're always interested in hearing about oil men's hobbies, and this is one of the best we've run across.

How Do You Spell—?

OUR favorite oil publication contains a lot of jaw-breaking technical words which keep our editors running to Webster's unabridged to check on the spelling, but, strange as it seems, the most spelling trouble comes with common, every-day words which everyone uses and ought to know how to spell.

Our own staff writers, alas, aren't always better than our contributing authors when it comes to some of these ordinary English words, which makes it rough on the copy desk and the proofreader. One of our comma hounds who has been blue-penciling copy for close to a quarter century knows the favorite misspellings of every one of our regular writers, but a quirk of orthography is likely to crop up anywhere.

He incidentally, is one of those narrow-minded people who believes there is only one way to spell a word, thus making life miserable for his less-inhibited colleagues who like to indulge in a little freedom and variety. For the benefit of such, and to save wear and tear on our well-thumbed dictionary, he has prepared the following list of words he finds misspelled most frequently. Try it on a friend, if you can get him to sit still that long.

Accommodate, occurred, accelerated, embarrass, separate, desiccant, interpret, incidentally, affects, effects, benefited, changeable, fulfil, grievous, harass, indispensable, noticeable, occasioned, parallel, permissible, precede, referred, seize, supersede, recommend, commitment, descent, existence, prejudice, proceed, stationary, dependent, exaggerate, principle and principal, serviceable, borne, iridescent, furthest, sizable.

P. S.—And if you find any errors in the above list, don't write and kid us about it. We will blame it on the much-abused printers, as we are prepared to swear that the copy was correct when it left our desk.

Little Venice

OIL men who collect stamps, and we hear quite a few do, probably already have the new Venezuelan issue featuring Lake Maracaibo and its discovery in 1499. They all know that this area is the center of the country's oil development, but perhaps not so many are aware that this swampy region of land and water gave the country its name.

The first explorers saw the Indian villages of primitive grass huts built on stilts along the lake's shores and promptly named the area Little Venice, or, in Spanish, Venezuela. Those adventurers were looking for gold, and the oily film on the lake meant no more to them than the Indians. It was not until the present generation that the real wealth of Little Venice was realized.

—Henry D. Ralph

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Henry D. Ralph

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415 Lexington, New York

INTERNATIONAL EDITOR
Dahl M. Duff
415 Lexington, New York

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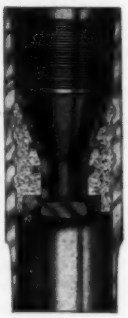

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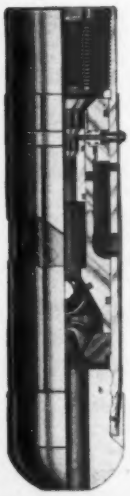

Baker Triplex Cementing Shoe, Product No. 136. Named "Triplex" because it performs a "triple" service: (1) is an efficient float shoe for running-in the casing; (2) whirls the cement slurry upward to minimize danger of channeling; (3) Metal Petal Basket expands to form a bridge which prevents cement contamination of low-pressure zones below.

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BAKER *Triplex* CEMENTING EQUIPMENT

Naval "Reserves"

Exploration and drilling off the Gulf Coast are slowing to a stop while the federal Government tries to decide how it will administer the so-called tidelands of which it is now the landlord. Now reports from Washington say that consideration is being given to turning this offshore area into a naval petroleum reserve.

This would be a throwback to an obsolete and thoroughly discredited concept of conservation and would effectively prevent the nation from getting any use of offshore oil.

The history of our naval petroleum reserves reveals a blind spot in our national thinking and shows how long an erroneous idea can persist. Naval petroleum reserves were created during the administrations of Presidents Theodore Roosevelt and William H. Taft, when the prevailing concept of conservation was the withdrawal of public lands from commercial development for creation of parks and national forests or until a policy for their development could be determined.

Some of the oil lands were turned over to the Navy which was then shifting from coal to oil as fuel. The theory was that when everybody else ran out of oil the Navy would still have some. Events have shown the fallacy of this theory. Our whole industrial economy depends on oil, and if the only oil left in the country were reserved to fuel the fleet there wouldn't be any Navy or any country. In time of war all the nation's oil goes into a common pot and is apportioned among all essential uses, military and civilian.

The administration of the naval petroleum reserves has not worked out any better in practice than in theory, even ignoring all the controversies, investigations, and politics. The only tract with enough oil to bother about is Elk Hills in California. During most of World War II it was kept largely shut in until, at tremendous expenditure of scare materials, drilling was stepped up so that for a few months it contributed about one-tenth of 1 per cent of national production.

There is evidence that the Navy is beginning to learn that the only true reserve for emergency is capacity for quick production—which means wells already drilled and pipe lines and refineries constructed. At present Elk Hills is being drilled up, slowly, to be able to produce more, but it can never yield more than a drop in the Navy's bucket. Recent wildcatting on the Alaskan reserve has been unsuccessful, not because of poor management but because of the inherent deficiencies of government operation.

Oil development requires quick, positive decisions and the risk of huge investments, and these cannot be had when Congress functions as the board of directors, as it has with our naval oil reserves so far. If we make the tidelands into another "reserve" we may as well write off the possibility of getting oil from them when we need it most.

THIS WEEK

SUPPLY—PAD spending much time and effort trying to aid industries in obtaining materials needed to carry on operations, but finds it difficult due to lack of formal priorities system. . . . ¶NPA issues additional orders on allocation of scarce materials, control of others. . . . ¶All railroad tank cars put under 6 months' control by ICC. . . . Discussion on fuels-supply situation scheduled February 19. . . .

WASHINGTON—House approves extension of reciprocal-trade agreement but revamps it to give measure of relief to oil, other industries. . . . ¶Internal Revenue Bureau issues tentative determinations of base-period rates of return for corporations subject to excess-profits tax. . . .

APPOINTMENTS—Alfred Frame of Cities Service Oil named assistant deputy of domestic-industry operations for PAD. . . . C. Stribling Snodgrass of Bechtel Corp. to oversee foreign petroleum operations for agency. . . . R. H. Hargrove of Texas Eastern Transmission named acting assistant PAD deputy for gas. . . . ¶NPC names W. W. Vandeveer of Cleveland as chairman of committee to investigate manpower requirements of oil and gas industries. . . .

NATURAL GAS—FPC declares discovery of gas reserves not keeping pace with increased demands. . . . ¶Gas is subject of various bills in Texas, Oklahoma, and Kansas, as legislators seek increased revenues, export bans, statewide prorationing, minimum price. . . . ¶El Paso Natural producing fuel for its pipe-line system in new plant which processes residue gas. . . .

INDUSTRY—Seven West Coast firms ask for postponement of antitrust suits. . . . ¶California Standard to build benzene plant at El Segundo refinery. . . . ¶Crude, products imports set all-time record in December 1950 with daily average of 933,000 bbl. . . . ¶Current difficulty in obtaining adequate tubular goods cited by Texas Gulf Producing official. . . . ¶Sinclair sets up new petrochemical division. . . . ¶Union Oil carrying on unique directional-drilling program in residential area near Los Angeles. . . .

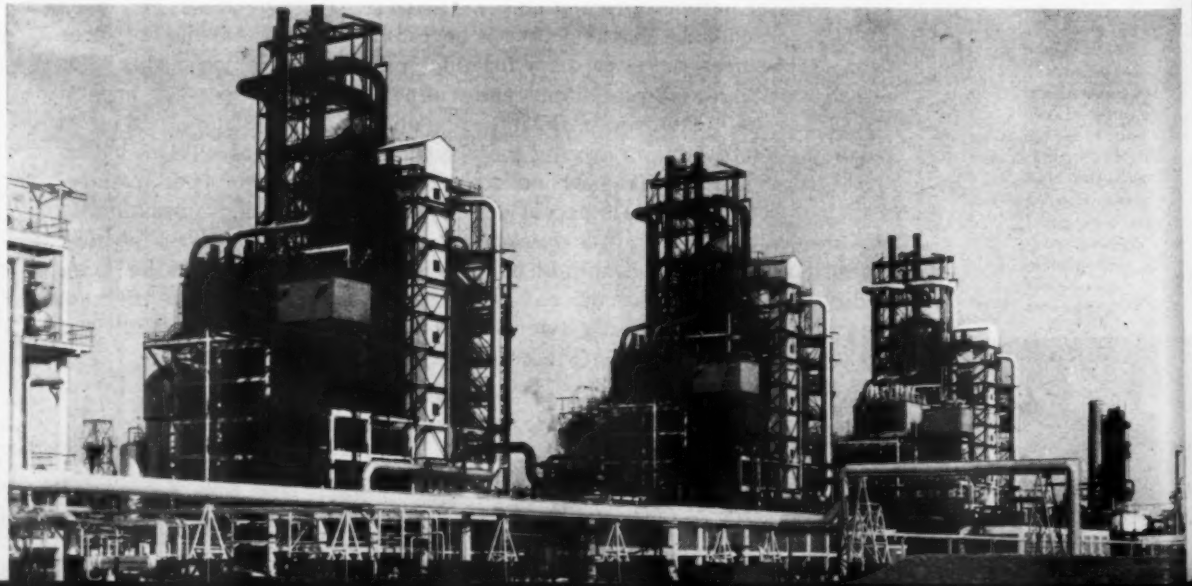
CANADA—First major petrochemical plant for western Canada assured by Celanese Corp. of America, which will begin construction of extended facilities near Edmonton. . . . ¶California-Standard Co. wildcat in southwestern corner of Manitoba touches off two lease plays. . . . ¶Hearing set April 5 by Alberta Conservation Board on applications of companies to build natural-gas-transmission lines from province to Pacific Northwest. . . .

ACTIVITY—Crude production for week ended February 10 averaged 5,798,800 bbl. daily, down 72,150 bbl. daily from previous week. . . . ¶Total well completions decreased to 684 from 753 a week earlier. . . . Wildcat completions increased 2 wells to 140 for the week. . . . ¶Rotary rigs operating in United States on February 5 totaled 2,018 compared with 2,111 for previous week and 1,885 for same week last year. . . .

TRENDS—Production of crude and field condensate expected to average about 5,935,000 bbl. daily this month. . . . ¶Crude imports will probably amount to 480,000 bbl. daily for a total new crude supply of 6,415,000 bbl. daily. . . . ¶Since exports, transfers, and losses account for about 155,000 bbl. daily, refinery runs greater than 6,260,000 bbl. daily will cause reductions in crude stocks. . . .

INTERNATIONAL—Jersey Standard, British reach agreement designed to provide long-term solution of dollar-oil problem in sterling area. . . . ¶Romanian legation in Washington reports country has increased crude-oil production by 140 per cent since industry was nationalized in 1948. . . . But radio monitors in Washington overhear Bucharest radio broadcast that country has failed to meet its production goals due to increasing absenteeism. . . . ¶U. S., British officials discuss measure to safeguard Middle East oil areas in event of war. . . . ¶Venezuela raises motor-fuel prices to help offset increased transportation costs. . . .

CROWDING THE LIMIT.—The nation's refineries, typified by this battery of catalytic crackers of Cities Service Oil Co. at Lake Charles, La., are operating at the highest levels in history. Runs recently have been as high as 6,500,000 bbl. per day, which is about 96 per cent of theoretical capacity. New construction may bring United States capacity to about 7,000,000 bbl. per day by the end of this year.



Materials Muddle

PAD, seeking to aid industry in securing supplies, finds going difficult due to lack of formal priorities system

Bertram F. Linz

WASHINGTON.—Petroleum Administration officials are devoting much of their time and effort to helping industry members secure equipment and materials needed for maintenance of operations, a difficult job in view of the lack of a formal priority system such as was used during the war.

A large number of requests for assistance are being received, some of them from refiners holding military contracts for whom the Armed Services Petroleum Purchasing Agency can provide "DO-98" ratings but many from companies needing material to keep in operation, although not specifically for military orders.

In the case of requests for material to maintain operations, the PAD materials division is taking them up directly with the appropriate division of the National Production Authority to secure a rating under which the applicant can secure the equipment he needs.

Proof needed.—In appealing for PAD assistance, however, it is necessary for a refiner to show conclusively that he has made every effort to fill his needs through normal channels and furnish complete information why he has been unsuccessful. If an order for equipment is refused, full details of the order must be given and, if possible, the name of the supplier whose failure to furnish a critical component of the equipment made its production impossible. This last is important, since it pinpoints the source of the refiner's difficulty.

The PAD procedure is proving of value to equipment manufacturers as well as refiners, since it helps the former secure components necessary to production. Producers are being assisted in much the same way to secure cement, chemicals, and other needs.

Pending the development of formal procedures for providing maintenance and repair materials, which may come within the next 3 months, the PAD materials division is developing data from the equipment-manufacturing industry which will help in taking care of distress cases.

Organization developing.—Meanwhile PAD, developing its organization, last week filled two top posts and began to set up its gas division.

Alfred P. Frame, vice president in charge of manufacturing and research for Cities Service Oil Co., who has been serving since last October as part-time consultant in charge of the aviation-gasoline program, has been appointed assistant deputy petroleum administrator in charge of domestic-industry operations. In that post he will serve as chairman of the PAD domestic operating committee, whose membership includes the directors of the production, refining, supply and transportation, program and materials divisions, and will be responsible for coordinating the plans and programs of those divisions.

C. Stribling Snodgrass, vice president of Bechtel Corp. and Bechtel International Corp., has been named assistant deputy administrator in charge of foreign petroleum operations.

Served with PAW.—Both Frame and Snodgress served with the Petroleum Administration for War, the former as director of the refining division from August 1944 to October 1945, and the latter as associate director of the foreign division and later director of the foreign refining division, serving from September 1941 until January 1946. Frame will serve without compensation and Snodgrass will serve as a regular government employe.

Announcing the appointments, Secretary Oscar L. Chapman paid high tribute to the two new officials.

"I am grateful that these two outstanding industry men have been willing to leave their businesses and join the staff of PAD," he said.

"As a part-time consultant since last October, Mr. Frame has done a splendid job in supervising the aviation-gasoline program and in assisting with a number of other important matters for the Petroleum Administration.

"In view of the growth of the oil industry abroad in recent years, and because of the strategic implications, foreign oil activities of PAD will be of great importance in the over-all defense petroleum program. Because of his extensive experience in this field, Mr. Snodgrass will be a valuable addition to PAD's staff."

Gas division.—Organization of the gas division got under way with the appointment of R. H. Hargrove, president of Texas Eastern Transmission Co., as acting assistant deputy for gas. Hargrove will serve until formation of the division has been completed and a permanent gas deputy is appointed.

Shortage problem.—PAD's major problem last week continued to be the serious shortage of heating oils in Michigan, Illinois, Wisconsin, and Indiana resulting from a combination of severe cold, snow, and ice on the roads, the railroad strike, and the freezing of barge routes.

In telegrams to the governors of the four states, Deputy Administrator Bruce K. Brown urged them to take the steps necessary to permit tank trucks to operate at full capacity despite state and local weight limitations. At the same time he wired 100 oil companies, fuel-oil distributors, and farm cooperatives in the shortage areas asking them to load and unload cars on a 24-hour, 7-day-week basis until normal conditions are restored, and called for maximum efficiency in tank-truck operations for the blance of the winter.

NPC appointment.—The National Petroleum Council, meanwhile, prepared its study of manpower requirements of the oil and gas industries as requested by the Interior Department. Walter S. Hallanan, NPC chairman, named W. W. Vandeveer of Cleveland as chairman of a 23-man body to take on the investigation.

Hallanan appointed a liquefied petroleum gas committee, headed by W. K. Warren, president of Warren Petroleum Corp., Tulsa, to study and report on demand by states for December 1950 and January 1951. The investigation was asked by the Interior Department, since there have been repeated local spot shortages of L.P.G.

Diesel meeting.—The National Production Authority has agreed to develop measures to assist the diesel-engine industry in securing supplies of materials needed for production of engines for essential uses.

The agency's assistance was pledged at a meeting of the diesel-engine industry-advisory committee at which committee members expressed concern over shortages of steel, aluminum, and other materials, pointing out that while the industry does not have many DO-rated orders at present it expects a substantial increase in the near future.

NPA officials said, however, that it may be necessary to limit future production of diesel engines to those needed for highly essential uses.

Among the committee members attending the meeting were R. H. Morse, Fairbanks, Morse & Co., Chicago; E. J. Schwanhausser, Worthington Pump & Machine Corp., Harrison, N. J.; M. C. Davison, Ingersoll-Rand Co., New York; F. Howard Kilberry, National Supply Co., Springfield, Ohio; R. A. Rankin, Chicago Pneumatic Tool Co., New York; and Gordon Lefebvre, Cooper-Bessemer Corp., Mount Vernon, Ohio.

XUM

NPA Appointment

Fleischmann named new agency administrator

WASHINGTON. — Manly Fleischmann, general counsel for the National Production Authority since its establishment last September, has been named NPA administrator to succeed William H. Harrison, who was appointed head of the Defense Production Administration last month.

Fleischmann served as assistant general counsel of the War Production Board and its predecessor agencies from April 1941 to August 1943, when he entered the Navy and was assigned to the Office of Strategic Services until he was released from service in September 1945.

New orders.—New orders issued by the NPA include the following:

Amendment to Order M-7, February 3: Increasing the percentage of DO orders producers and fabricators of aluminum must accept and prohibiting the use of aluminum in more than 200 less essential items after April 1.

Order M-32, January 23: Providing for the orderly acceptance of DO-rated orders by the chemical industry.

Amendment to Order M-32, February 3: Setting a ceiling of 25 per cent of scheduled monthly production on defense orders required to be accepted by producers of dichloro diphenyl trichloroethane.

Amendment to Order M-2, February 3: Reducing the permitted civilian consumption of new rubber in February from 80 to 72 per cent of base-period use, limiting the consumption of natural rubber to 43 per cent of the base period in February and 35 per cent in March, and prohibiting the use of natural rubber for nonessential items.

Delegation 7, February 5: Authorizing NPA field offices to act directly on special hardship applications for commercial construction arising out of Order M-4 restricting such construction.

Order M-34, February 5: Reserving certain leathers for military use.

Order M-35, February 5: Halting advance sales of certain hides and skins.

Amendment to Order M-14, February 8: Prohibiting manufacturers of nickel alloys from extending priority ratings to replace nickel used prior to January 1 for the manufacture of stainless steel, high-nickel alloy, nickel silver, or other nickel-bearing alloy material.

Order M-36, February 8: Requiring paper producers to establish reserves in percentages of their monthly production to fill qualified government orders.

Amendment 4 to Order M-4, February 9: Requiring NPA authorization for the construction of office buildings.

Order M-30, January 22: Restricting the end uses of tungsten.

Amendment to Order M-1, January 22: Increasing the percentage ceilings which establish the quantities of various steel products for which suppliers are required to accept DO-rated orders.

Order M-31, January 23: Requiring producers and distributors to continue filling orders from their 1950 purchasers of chlorine, whether public or private, for purification of water for human consumption and use or treatment of sewage essential to public health.

Amendment to Order M-22, January 23: Postponing the effective date of the aluminum-scrap order to March 1.

Amendment to Order M-14, January 23: Prohibiting the use of nickel in about 400 items.

The following orders were issued by the Economic Stabilization Agency:

General Regulation 5, February 5: Providing for adjustments of wages for individual employes.

Ceiling Price Regulation 5 (Office of Price Stabilization), February 5: Providing ceiling prices for iron and steel scrap.

Defense Production Administration:

Delegation No. 1, January 24: Returning to other agencies functions relating to priorities, allocations, and other operations now being carried on by them.

Office of Defense Mobilization:

Order No. 1, January 19: Creating a committee on foreign supplies and requirements.

Tank Cars Under Control

WASHINGTON. — The Interstate Commerce Commission has put a 6-months' control on railroad tank cars and appointed an agent with authority to regulate their movement.

The action was taken on representation by the Defense Transport Administration that there is a shortage of cars which will be aggravated in coming months by weather conditions and the needs of the armed forces and national defense and makes necsary regulation of the use, control, supply, movement, distribution, exchange, and return of cars. The commission held that an emergency exists in all sections of the country.

Under the ICC order, the agent, Richard H. Lamberton, is given authority to direct the distribution of all tank cars without regard to ownership or assignment and supervise car movements, until July 31. Lamberton will work out of the ICC building in Washington.

Freight-car builders delivered 265 tank cars during January, but in the same month received orders for 1,358 and on February 1 had on hand orders for 8,669, the Association of American Railroads reported.

Deliveries of new freight cars of all kinds amounted to 5,949, an increase of only 249 over December because of the limited quantities of steel received during the fourth quarter of last year. Beginning with January, however, the National Production Authority has provided for the allocation of sufficient steel to produce 10,000 cars a month and it is expected that car production will approach that figure by April or May.

Fuels Discussion

Round-table on situation scheduled for February 19

WASHINGTON.—Representatives of the fuel industries will meet with the Senate interior affairs committee February 19 for a round-table discussion of the fuel situation as a prelude to formal hearings at a later date.

More than a dozen company executives, including several oil men, have been invited to attend the meeting to comment on a wide variety of questions which the committee will study during its investigation, authorized last year by the Senate in approving a resolution sponsored by former Sen. Francis Myers of Pennsylvania.

The committee is instructed to make a study of all fuels except atomic energy, but is expected to devote most of its time to oil and coal. It has until June 30 to complete its investigation and submit a report.

Questions slated.—Among the questions slated for discussion at the February 19 meeting is whether consideration should be given to the establishment of military oil reserves in the tidelands before opening them up for private development. This question ties in with a resolution introduced by Sen. Joseph C. O'Mahoney of Wyoming, chairman of the committee, for interim administration by the Secretary of the Interior pending the enactment of permanent legislation, on which hearings are scheduled to be held in the near future.

Other questions developed by the committee staff for study are whether the defense situation warrants the setting up of a stockpiling program for liquid and solid fuels; the extent to which civilian oil consumption might have to be restricted under the defense program, and the effect of such restriction on expanding farm mechanization and railroad transportation capacity.

Production. — The committee also is interested in developing details of the productive capacity of the oil, gas and coal industries; whether the era of oil and gas discoveries at a steadily increasing rate with expanding consumption has passed, and what the effect might be of the loss of access to Middle East or Venezuelan oil.

An effort also will be made to de-

WATCHING WASHINGTON

Bertram F. Linz

Freedom in the Field

The allocation program for tubular goods which the Petroleum Administration plans to institute in the third quarter of this year does not mean that producers will be put under regulations requiring fixed well-spacing patterns or other restrictions on their freedom to operate in their normal manner.

Well spacing and other restrictions may have to be imposed eventually, as they were during the last war, but PAD plans to go as long as possible without resorting to regulation and, in accordance with the understanding reached recently with representatives of the state regulatory bodies, leave it to the state agencies to lay down any rules they may find necessary to prevent unnecessary concentration of wells.

PAD, however, will be in a position to check the operations of producers, since it will require each applicant for tubular goods to submit a complete report on his proposed operations. This will afford an opportunity to step in if there are indications that an operator's plans call for unnecessary use of materials.

Sulfuric Acid Shortage

Sulfur and sulfuric acid appear slated to be the first products to be put under allocation control, probably next month, as the National Production Authority moves to overcome the effects of materials shortages on the defense program.

Due to export commitments, there is a substantial deficiency in the availability of sulfur which is translated into a shortage of sulfuric acid, of which the refining industry is a big consumer, accounting for approximately 15 per cent of the total use. The severity of the pinch is evidenced by the number of appeals coming into the Petroleum Administration from refiners who are encountering difficulty in securing supplies.

Refiners Facing Trouble

Refiners needing special steels for plant equipment are going to have trouble in some cases in filling their requirements, and the reason will be found in this general picture of critical ferro-alloys drawn by National Production Authority steel experts.

Cobalt — Now under complete end-use restriction and allocation, with virtually the entire supply needed for defense and essential civilian needs.

Columbium — Ninety-eight per cent of the present supply is going into defense needs; there is little prospect for increased production, and end-use limitation and allocation is under consideration.

Nickel—Less nickel is now available per ton of steel produced than in 1943-45; NPA is screening DO-rated orders but essential civilian supplies are so short that end-use limitation and allocation will be necessary.

Molybdenum — DO demands at the end of January exceeded total supply and all stocks were frozen by NPA and deliveries permitted only on 50 per cent of DO's and 50 per cent of tool-steel requirements; end-use limitation and allocation will be ordered as soon as it can be worked out.

Tungsten — Will go under complete end-use limitation and allocation March 1; 70 per cent of our normal supply comes from China and Korea and has been cut off.

Chromium—Rather tight in supply but additional facilities are now coming into production.

Manganese—Facilities appear adequate to meet the foreseeable needs.

Silicon—Supplies generally adequate for all demands and no serious shortage appears likely.

Producers Hopping Mad

Domestic oil producers are just plain sore over the administration's proposals to double the gasoline tax and reduce the precentage depletion allowance, and will make their views known in no uncertain terms when the House ways and means committee gets around to hearing them later this month.

In laying his recommendations before the committee, Treasury Secretary John W. Snyder estimated the increase in the gasoline tax would raise close to $600,000,000 a year and revision of the depletion allowance and intangible drilling-expense option would add another $400,000,000.

To say it quickly, the oil men don't like the idea of the Government attempting to collect a billion dollars from their industry alone. That would be 10 per cent of the total $10,000,000,000 tax increase asked by the President. Add to that the increased individual and corporation taxes the administration wants, and it looks like the oil industry and its members have been singled out to play the part of Santa Claus.

termine whether the discontinuance after the war of subsidies for stripper wells has resulted in any significant decline in production and should be reestablished, and the situation with respect to synthetic liquid-fuel development and what is needed to get commercial production.

Gas Reserves

Discoveries not keeping demand pace, FPC says

WASHINGTON.—Discoveries of natural-gas reserves are not keeping pace with increases in demand and on the basis of 1950 figures the proven recoverable reserves are equivalent to a supply, at current consumption, of about 28.8 years instead of the 31 years previously estimated on the basis of 1947 production, it was reported last week by the Federal Power Commission.

In the light of this situation, the commission said in its annual report to Congress, it has been giving close attention to the question of the adequacy of gas supplies claimed to be available to pipe-line companies proposing major new projects or additions to existing systems.

Projects O.K.'d.—During the fiscal year ended June 30, FPC issued 108 certificates for construction of 6,188 miles of pipe lines with 333,195 compressor horsepower having an estimated cost of $487,240,014, while another 13 applications for 3,634 miles of line to cost $279,843,975 were dismissed or withdrawn. As of June 30 there were 90 certificate applications pending for construction of 17,062 miles of line with compressor horsepower of 788,420 at an estimated cost of $1,106,163,081.

Balance sheets filed by companies under FPC jurisdiction showed their assets as of December 31, 1949, as $5,351,975,000. Gross gas-utility plant amounted to $4,406,248,000, an increase of more than $600,000,000 during the year, but including utility plant other than gas, the plant accounts of the companies showed a gross increase of slightly over $800,000,000.

Revenues.—Operating revenues for natural-gas service supplied by companies under commission jurisdiction amounted to $1,147,057,000 during the year, representing an increase of $113,333,000 or 11 per cent over 1948, but for the first 6 months of 1950 operating revenues were running more than 20 per cent over the corresponding period in 1949.

Gross income of the companies, including gas and other utility operating income and miscellaneous revenue, amounted to $294,000,000 in 1949 compared to $266,014,000 in the previous year. Net income was $225,917,000, representing an increase of $15,032,-

000 or 7.1 per cent over 1948, but for the first 6 months of 1950 net income was up more than 30 per cent over the first half of 1949.

Trade Agreement

House O.K.'s extension of bill, but makes changes

WASHINGTON. — The administration received its first serious rebuff from the 1951 Congress last week when the House approved extension of the Reciprocal Trade Act for another 3 years but revamped it to give a measure of relief to the oil and other industries seriously affected by low-duty imports.

Aligned with the Republicans in overwhelming administration efforts to extend the law without change were Democrats from states with industries that have been seriously hurt by the reciprocal trade agreements. There are a number of such industries in addition to oil, among them watches, optical glass and shoes, all vitally important in the defense program.

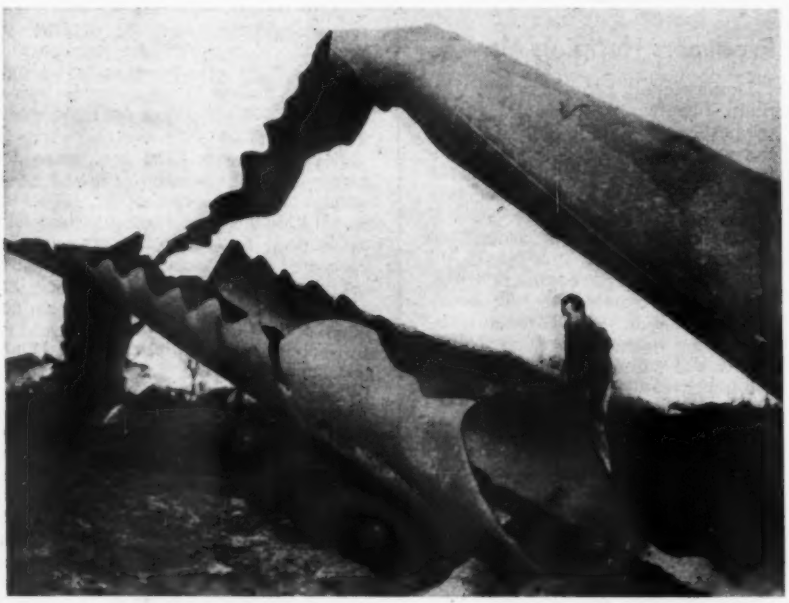
The House adopted four major amendments to the law, one of them the peril-point amendment written into the bill by the Republican Eightieth Congress and written out when the Democrats regained control.

Terms. — Under that amendment, when a new reciprocal trade agreement is contemplated the Tariff Commission is to pass on the commodities on which it is proposed to consider concessions and report to the President the point on each item below which tariffs cannot be reduced without imperiling American industry. If the President decides to reduce any tariff below the peril point despite the Tariff Commission's warning, he would be required to notify Congress within 30 days, stating the reasons for his action.

A second amendment provided an escape clause under which industries adversely affected by imports under a trade agreement could secure an investigation by the Tariff Commission, which would recommend to the President the action he should take by way of remedy.

The third amendment would require the President, in the making of future agreements, to deny tariff concessions to the goods of any Communist or Communist-controlled country, and the fourth provides that concessions on foreign farm commodities shall not apply unless the imported product is to be sold above the support price.

Unexpected defeat.—The House action on the reciprocal trade bill was an unexpected defeat for the administration, which had expected the measure would be passed without change by that body, in which it has a 35-vote majority, and looked for difficulty in the Senate where the Democrats have only a 2-vote margin.



Good to the Last Weld

The tremendous wallop which can be packed into a pipe-line explosion was recently unleashed against a mile-long section of this 30-in. natural-gas-transmission line. Although the pipe was ripped apart like so much tinfoil, all welds, both longitudinal and circumferential, held fast, proving that a good weld is stronger than pipe itself. (Acme photo, courtesy Lincoln Electric Co.)

Tax Period Determined

WASHINGTON.—The Internal Revenue Bureau last week issued tentative determinations of the base-period rates of return for corporations subject to the excess-profits tax.

For the oil and gas industries, the bureau held the rates to be 10 per cent for producers, 8.3 per cent for refiners, 10.1 per cent for pipe lines, and 25 per cent for service stations.

Under the corporation tax-increase bill enacted by Congress last year, an excess-profits tax of 30 per cent was imposed on corporate net income in excess of the average income in the 4 years 1946-49. As an alternative, a corporation may base its tax on a rate of return on invested capital, but experience has been that the great majority of concerns use the average-earnings base.

In setting the base-period rate of return for producers, the bureau determined that the yearly rates of return were 5.1 per cent for 1946, 9.7 per cent for 1947, 11.8 per cent for 1948, and 11.2 per cent for 1949. The rates for the other branches for the same years were, respectively: refiners, 6.1, 8.7, 11.3, and 6.6 per cent; pipe lines, 11.1, 10.5, 10.5, and 9.1 per cent; and filling stations, 27.5, 33, 27.3, and 15.7 per cent.

Under the law, taxpayers are permitted to eliminate the poorest of the 4 base-period years, and the normal tax net income of the remaining years is then adjusted to reflect one-half of any net additions to capital in 1948 and all such additions in 1949.

Pricing Legislation Urged

WASHINGTON. — The Senate was asked last week to enact legislation affairming the decision of the Supreme Court in the Standard Oil Co. (Ind.) case that the cutting of prices in good faith to meet the lower legal price of a competitor is not in violation of the Robinson-Patman A

The measure was introduced by Sen. Pat McCarran of Nevada and also carries the names of Sens. Edwin C. Johnson of Colorado, Herbert R. O'Connor of Maryland, Kenneth S. Wherry of Nebraska, Homer E. Capehart of Indiana, and John W. Bricker of Ohio.

The bill would add a new subsection to the act providing that "it shall be a complete defense to a charge of discrimination in price of services or facilities furnished for the seller to show that his differential in price, or his furnishing of greater services or facilities, was made in good faith to meet the equally low price of, or the equally extensive services or facilities furnished by, a competitor: Provided, that a seller shall not be deemed to have acted in good faith if he knew or should have known that the lower price or more extensive services or facilities which he met were in fact unlawful."

Gas Under Attack

Fuel is subject of various bills in Texas Legislature which seek more taxes, prorationing, and minimum price

Leigh S. McCaslin, Jr.

AUSTIN.—Natural gas is in the limelight as the current session of the Texas Legislature gets well under way. Increased taxation, statewide prorationing, exports, and a minimum price for the fuel are subjects of various bills which have been introduced.

Rep. R. E. Blount, of Big Spring, has introduced two bills and a resolution pertaining to the subject. His House Bill 179 would double the present severance tax on natural gas. Current rate is 5.72 per cent of value at the well head and yields more than $10,000,000 annually now. Blount's bill asks for a tax of 11.44 per cent of market value. It provides a minimum tax of 242/1,500 of 1 cent per 1,000 cu. ft., and exempts injected gas, legally flared gas, and gas used in lifting oil, unless sold for that purpose.

Blount's second bill would set a 10-cent per 1,000 cu. ft. minimum price on Texas gas. The proposal also provides that the Railroad Commission can determine the price at which gas may be sold so as not to constitute waste, in these cases: (1) where gas contains less than 1,000 B.t.u. per 1,000 cu. ft.; (2) where it is produced at points remote from transportation facilities; (3) where it is produced at pressures too low for transmission; and, (4) where the gas contains more than 1,000 B.t.u. per 1,000 cu. ft., but sale at 10 cents would constitute waste.

Resolution.—The resolution proposed by the Big Spring representative would (1) ask the Railroad Commission to appear before the Federal Power Commission in opposition to the granting of additional certificates to planners and promoters of interstate pipe lines, and (2) call for the commission to aid the legislature in setting up a "state policy for use and production of gas."

Rep. Deno Tufares, of Wichita Falls, has introduced a bill which, among other items, would levy a ¼-cent per 1,000 cu. ft. privilege tax on "gathering" of natural gas. A bill which calls for state-wide proration of natural gas, rather than on the current field basis, has been submitted by Rep. John E. Morrison, Jr., of Chillicothe. Morrison is also the sponsor of a second bill calling for a minimum well-head price of 10 cents per 1,000 cu. ft.

The issue of a minimum price came into the spotlight December 11 when the U. S. Supreme Court upheld a 7-cent per 1,000 cu. ft. minimum price set by the Oklahoma Corporation Commission. The price applied to gas produced in the Oklahoma portion of Guymon-Hugoton field.

T.I.P.R.O. action.—The Texas Independent Producers and Royalty Owners Association entered into the picture last week when its executive committee adopted three resolutions pertaining to natural gas The first placed T.I.P.R.O. "on record here and now as pledging the efforts and energies of this association in immediate action on behalf of the independent producers and royalty owners of this state toward removing the present inequities and limitations imposed by monopolistic gas-purchasing companies."

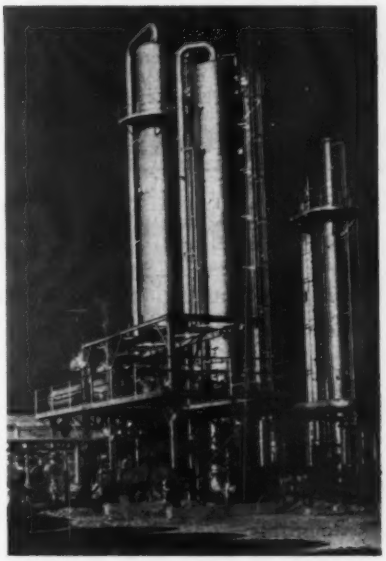
The second provided "that the Texas Railroad Commission be petitioned to make immediate, necessary rules for the posting of tariffs by gas-pipe-line companies and that if such authority does not now reside in the Railroad Commission this association shall support legislation which would give authority to the commission."

T.I.P.R.O.'s third resolution petitioned the Railroad Commission "to require the filing with the commission, as a matter of public record, a copy of every gas contract and amendment thereto entered into in the State of Texas"

Hearing to be asked.—The association officials also indicated that they plan to ask the Railroad Commission to call a hearing in the near future to study natural-gas problems concerning independent producers and royalty owners.

T.I.P.R.O. has indicated in the past that it favors a higher price for natural gas, but does not want to bring about government interference. R. L. Foree of Dallas, president of the group, said "we are fully aware of inherent dangers in price fixing by any governmental body. If an arbitrary price is to be fixed at which gas can be produced, that same authority might reasonably be extended to dictate price conditions under which it can be consumed."

It was voted to have R. L. Foree, association president, name a committee to study all phases of the price problem and meet with the Railroad Commission for determination of exactly what powers the commission has in the matter.



PROCESS RESIDUE GAS.—This new sour-gas-treating plant in McElroy-Crane area of Texas is operated by El Paso Natural Gas Co. The facilities handle 16,760,000 cu. ft. of untreated gas daily, which results in recovery of 15,000,000 cu. ft. of pipe-line gas. This is later intermingled with natural gas from other El Paso plants, and finds its way into the company's natural-gas transmission system.

New Treating Plant

El Paso facilities yield gas for pipe-line system

EL PASO.—A new treating plant which processes sour residue gas into a product that is intermingled with sweet natural gas in its pipe-line system is now in operation by El Paso Natural Gas Co. in McElroy-Crane field, West Texas.

The plant is processing approximately 16,760,000 cu. ft. of untreated gas daily, which results in a delivery of 15,000,000 cu. ft. of pipe-line gas to El Paso's transmission system.

The residue gas is delivered into the plant from Phillips Petroleum Co.'s gasoline plant, which originally obtained it from McElroy-Crane field. The treated gas emerging from El Paso's plant is mixed with natural gas processed by other nearby El Paso Natural plants, and much of it reaches markets in California through a connection with El Paso's system at Pacific Gas & Electric Co.'s terminal at Topock, Ariz. Other supplies are delivered to points in West Texas, New Mexico, and Arizona.

Operation.—The McElroy-Crane plant uses glycol-amine process for treating and dehydration. Untreated gas which is delivered to the plant is

XUM

unusually high in acid-gas content, running about 7 per cent H_2S and about 4½ per cent CO_2, or a total waste-gas content of 11½ per cent.

Treating is accomplished in two stages: First, the gas, delivered into the plant at 30 psi., is given initial treating at the prevailing pressure, which reduces sulfur content to about 15 grains per 100 cu. ft. Second, the gas is compressed to 800 psi. and dehydrated.

The two-stage treating operations result in more economy.

WEST COAST

Drilling "De Luxe"

Many unusual practices are incorporated in directional drilling program of Union Oil in elite residential area

D. H. Stormont

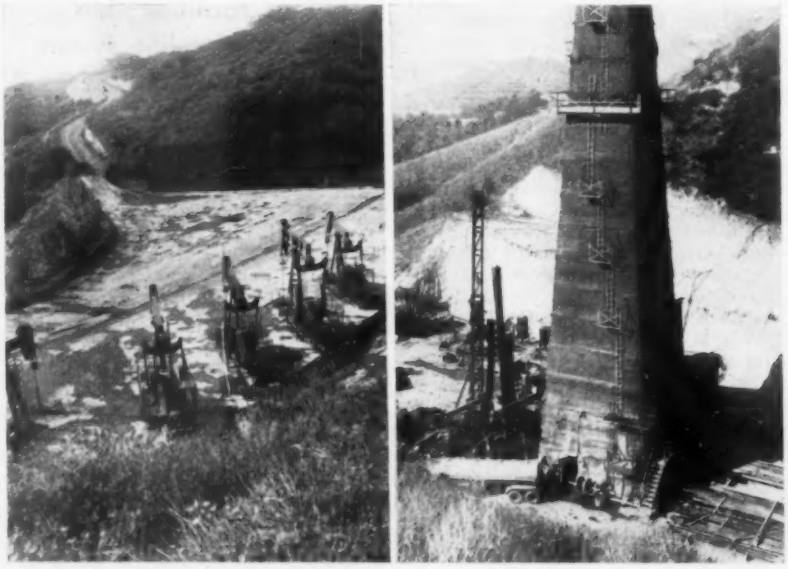
LOS ANGELES.—At La Habra Heights, an area of nice homes and substantial avocado and lemon groves on this city's eastern outskirts, Union Oil Co. is proceeding with an unusual development.

Because it owns only the mineral rights, and even the space for a drilling site amounts to too many thousand dollars, controlled directional drilling from central islands is being practiced. Because of the proximity of surrounding homes, drilling machinery is housed in a soundproof envelope and all activity is made as "hush-hush" as possible.

Attracted by oil seeps on the property, Union secured the mineral and drilling rights to the 2,000-acre tract back in 1904. After several sporadic attempts to develop oil, during which 15 dry holes or marginal producers were drilled, good production was found in 1945. Between then and the first of 1949, however, only one other well was drilled.

Third island.—Currently the company is preparing a third island location after drilling 13 producers from one location and shortly will complete the eighth and final well from a second island. The second island was located about 1,700 ft. west of the first. The new one, from which it is planned to drill 15 wells, is 3,100 ft. east of the first.

All producers have been completed in the Miocene sand fault-block pool encountered at a vertical depth of 2,800 to 4,500 ft. As some were bottomed as far out as 1,600 ft. from the rig site, requiring angles as high as 58°, drilled depths of wells in some instances have exceeded 6,000 ft. Development from the first two islands shows the field, known as Sansinena, to be only about ½ mile in width—or at least such is the case on the western end which has been drilled.



QUIET DRILLING.—All means of eliminating operational noises have been used by the contractor in carrying out Union Oil Co.'s directional-drilling development program in Sansinena field. Located in an exclusive residential area near Los Angeles, the company has won good will of home owners by making special efforts to muffle noise and hide unsightly equipment. At left, some of the 13 producers drilled on the first "island" location. Note screen at far end of location, which is used to hide traps and other equipment. At right, soundproofed rig which is covered with insulated canvas.

Good-will efforts.—When Union was preparing to start development from the first island, it took several extra-curricular steps to gain the good will of property owners in the area. First, it voluntarily agreed to give the fee owners 10 per cent of the field's monthly oil production. The amount was split among the participants on the basis of the 1940 evaluation of their property and improvements.

In the beginning all surface-right owners in the 2,000-acre tract shared in the monthly dividend. Since then, as Union gained more knowledge of the field's probable extent, about 20 per cent of the tract has been quit-claimed—the mineral rights being given to the fee owners.

Rigs covered.—Another step has been the use of a soundproof cover on the rig. The engine house, mud pumps, and the derrick from gin pole to ground are completely shrouded in tailored canvas panels padded with glass wool. So effective is this covering that very little of the drilling activity can be heard at a distance of 40 or 50 ft.

The company also restricts travel of its and the contractor's pickups and other trucks to the hours between 8 a.m. and 6 p.m. During the night activity outside the derrick is kept to an absolute minimum. To gain further muffling of sound and to hide the activity as much as possible from public view, drill sites have been chosen in the rear or between steep-sloped hills.

Drilling practices.—Drilling practices also have been modified to eliminate possible disturbances. The 5⅞-in. drill pipe is never laid down; it is kept racked inside the derrick even during the 17½-ft. moves from well to well. When adding to the drill-stem, one 40-ft. joint of the racked doubles is added to the stem and the other is placed in the mousehole. Lack of space inside the derrick prevents the 2⅞-in. drilling-in tubing from being racked there so that it is laid down between jobs.

Other practices and noise-deadening measures followed include the use of vacuum trucks to remove all cuttings and waste from the sump. The standby mud pump, which is placed outside the soundproof covering, is never used for mud or chemical mixing after 6 p.m. Two sets of silencers are used on both the drilling and mud-pump engines. In bringing tubular goods onto the derrick floor, the work is done by hand rather than using the high line.

Biggest problem.—Greatest problem, however, centers around transportation and the necessary planning required to keep drilling 24 hours a day. If a casing or cement job is likely to be needed during the night, the men and equipment must be on hand before 6 p.m. To keep such standby time at a minimum requires much planning and foresight on the part of the tool pusher, P. J. Thayer of Santa Fe Drilling Co.

As all but one of the wells from each island are bottomed some distance from the drill site, the transportation problem for service companies' equipment also enters this phase of the work. Directional control is obtained by the Homco single-shot instrument, with readings taken at about 20-ft. intervals once the hole is deviated from the vertical. Thus if such service, or that of a logging truck, is to be needed during the night they also must be on hand before 6 p.m.

Maintenance.—Maintenance of equipment to prevent costly shutdowns during night hours is another problem. Aside from the time spent in moving from the first to the second island, and the 10-hour moving time between each well on an island, little such time has been allowed since the rig was first put to work in February 1949. Thus the condition of equipment is closely watched and when a well is completed mechanics are called in to place all equipment in first-class shape.

How have the surrounding residents responded to this good-neighbor policy of Union? At the first island there were a few complaints, principally from nearby residents whose homes had been built since 1940 and thus were not sharing in the 10 per cent cut. At the present location the principal complaint concerned an after-hour truck—owned by a party not at all associated with the development.

Benzene Plant Planned

SAN FRANCISCO. — Standard Oil Co. of California has announced that it will soon begin construction of an 850 bbl. daily benzene plant at its El Segundo refinery near Los Angeles. The plant will cost in excess of $10,000,000, and will also be designed for the manufacture of 3,200 bbl. of toluene daily. The new facilities will be built around Universal Oil Products Co.'s new Platforming process, and are expected to be in operation by July 1952.

In making the announcement, Standard's president, T. P. Peterson, pointed out the recent Petroleum Administration for Defense request that the oil industry increase benzene production in order to meet the growing demand for this material from the synthetic rubber industry. The new plant will produce about 15 per cent of the increase asked by PAD, he said, and will substantially increase the refinery's output of aviation gasoline.

Antitrust Case

Seven West Coast firms ask postponement of suit

LOS ANGELES.—Attorneys for the West Coast's seven largest oil companies last week asked Judge James M. Carter in Los Angeles Federal Court for a postponement of the antitrust suit filed against them in the same court last May.

At that time the Justice Department's antitrust division charged the companies with violation of the antitrust laws in the production, transportation, refining, and marketing of crude and refined products in California, Oregon, Washington, Nevada, and Arizona. Named as defendants were Standard Oil Co. of California, The Texas Co., Shell Oil Co., Tide Water Associated Oil Co., Richfield Oil Corp., General Petroleum Corp., and Union Oil Co. of California.

The Conservation Committee of California Oil Producers was named as the tool through which they operated. *(The Oil and Gas Journal, May 18, 1950, page 100.)*

Basis.—Basis of the postponement request was the contention that the action covered substantially the same charges as were contained in the Mother Hubbard antitrust suit filed in 1940. Made against the American Petroleum Institute and most of the larger companies in the United States, including the seven West Coast companies, this case has never been brought to trial. Attorneys for the seven companies asked that any further proceedings under the later suit be stopped until the Government disposes of the first suit.

Francis Kirkham, attorney for California Standard, also entered objections to certain interrogatories filed in the West Coast case. He claimed that the necessary research going back into the 1930's would require nearly 500 manhours of work on the part of management and operating personnel whose time is taken up in meeting the company's share of military and civilian petroleum requirements.

Immaterial facts.—These interrogatories, Kirkham pointed out, cover 88 pages; the questions and their ramifications involving hundreds of thousands of detailed answers. He declared many of them called for immaterial and irrelevant facts, "not calculated to lead to the discovery of admissible evidence."

Robert L. Minckler, president of General Petroleum, commenting on this move, said:

"Ten years ago the antitrust lawyers of the Department of Justice brought a suit against many of the oil companies of the country, including General Petroleum, making various imaginary charges. This suit was never brought to trial, but is still pending.

"Since then, the lawyers who worked up this old case have disappeared from the scene, moving on, hopefully, to more useful work.

"Last summer a new batch of lawyers cooked up another suit, repeating most of the old charges, dropping a few, and dreaming up some new ones.

"We are asking the court to make the Government either dismiss or try the old case before we undertake the enormous task of wasting manpower defending ourselves from the unwarranted charges in this second case."

CANADA

Petrochem Plant

First major installation planned by Celanese Corp.

THE first major petrochemical plant for western Canada was assured last week as Celanese Corp. of America announced that its newly formed Canadian subsidiary, Canadian Chemical Co., Ltd., will shortly begin construction of a large plant in the Edmonton area of Alberta. The new plant will utilize newly developed natural-gas reserves in the prairie province, and will tie into other Celanese operations in Canada to produce cellulose acetate.

The direct oxidation process employed at the company's giant Chemcel plant at Bishop, Tex., will be used at the new Edmonton plant. Propane and butanes will comprise the principal raw-hydrocarbons materials, which will be converted into a number of basic aliphatic chemicals. Acetic acid to be produced in tonnage quantities will be combined with wood pulp from the plant of the affiliated Columbia Cellulose Co., Ltd., at Prince Rupert, B. C., to manufacture cellulose acetate, the basic material for acetate yarns and plastics.

Other chemicals. — Like the Chemcel plant in Texas, the new Canadian installation will produce many additional chemicals which will be made available to outside industry. Prominent among them is formaldehyde, which will be produced almost entirely in the new flake form termed paraformaldehyde. The process developed in Texas produces the chemical in a solid form, eliminating much transportation cost normally incurred in handling the usual 37 per cent solution of the chemical in water.

Additional products which will be synthesized in tonnage quantities include: acetaldehyde, acetone, methanol, ethanol, isopropanol, propanol, isobutanol, propylene glycol, dipro-

pylene glycol, dibutylene glycol, acetic anhydride, and n-propionaldehyde.

As basic chemicals in the manufacture of military products, antifreeze solutions, plywood adhesives and laminants, varnishes, lacquers, hydraulic fluids, synthetic rubber, insecticides, textile dyes, and pharmaceuticals, these chemicals will provide the basis for additional new chemical industries in the prairie provinces of Canada.

Hydrocarbon sources.—Specific sources of the hydrocarbons are not yet revealed. They will be available from natural-gasoline plants and refineries of the general region in sufficient quantity to support a large scale petrochemical operation for many years.

The Celanese plant is the second Canadian petrochemical plant to be announced within a month. The other, to be built by Dominion Tar & Chemical Co., Ltd., will be located at Montreal East and will utilize refinery gas from a major plant located in that city.

Well Sets Off Lease Plays

The reported oil strike of California-Standard Co.'s well 600 miles east and south of oil fields in Alberta has created a rush for mineral rights in southwestern Manitoba. Operators, hiring snowmobiles for as much as $65 per day, are taking leases within a radius of 40 miles from the well site.

California-Standard 15-18 Daly, drilled to 8,368 ft., last week was plugged back to bale about 3 bbl. of oil per hour, averaging 30 per cent water. While this is not considered commercial, it is regarded as encouraging for further exploration in the general area *(The Oil and Gas Journal, February 8, 1951, page 133)*.

Operators are paying from $3 to $5 per acre bonus, plus one-eighth royalty for leases in the area which was mainly settled prior to 1890, the year the government began retaining mineral rights on crown lands.

The wildcat test was located after several years of intensive geological and geophysical work in the immediate area, and is located about 170 miles west of Winnepeg and 9 miles west of Virden townsite. Spot is LSD 15, 18-10-27w1, which puts the well in the shallow northeastern shelf area of the large but sparsely tested Williston basin.

On the United States side of the border, reports from Bismarck, N. D., indicate that leasing is heavy along the northern side of the heart of the Williston basin in North Dakota through Bottineau, McHenry, Pierce, and Rolette counties. This play is also attributed to the California-Standard wildcat, which is about 65 miles north of West Hope, N. D. Also reported active in this area is The California Co., which like California-Standard, is a subsidiary of Standard Oil Co. of California. The area is east of extensive holdings by Stanolind Oil & Gas Co., Carter Oil Co., and others acquired in 1949-50.

Gas-Export Hearing Set

OTTAWA.—Following the ruling of the Alberta Conservation Board that no permits for gas export from the province would be granted until gas reserves of at least 4½ trillion cubic feet are proven, the Board of Transport Commissioners here has deferred until April 5 hearings on applications of four companies for permission to build natural-gas pipe lines out of Alberta.

The transport commission ruled that no more than two alternative routes, one all-Canadian and the other dipping into the United States before returning to Canada, can be proposed by each applicant. The restriction affects the Alberta Natural Gas Co., which proposed four alternative routes.

Meanwhile, United States Defense Mobilizer Charles E. Wilson was asked to declare importation of natural gas from Canada to the Pacific Northwest vital to the security and defense of the continent by Rep. H. B. Mitchell of the State of Washington.

In a letter to Wilson, Mitchell said there is "no doubt that this emergency need is great." The proposed pipe line from Alberta to the area could deliver the kilowatt equivalent of the present power output of both Grand Coulee and Bonneville dams thereby enabling the Northwest to divert power to aluminum production and other defense purposes, he said.

MID-CONTINENT

States Seek Oil, Gas Tax

Two Mid-Continent state legislatures are eyeing petroleum and natural gas as a source for additional income or for further state controls.

A bill has been introduced in the Oklahoma Legislature seeking a severance tax on oil and natural-gas resources to finance a possible veterans' bonus, and in Kansas legislation has been proposed to prevent exportation of gas from the state whenever it is needed for the welfare of Kansas.

The Oklahoma proposal, calling for a 10 cents per barrel tax on oil, brought retorts from various oil-industry leaders, with one stating that it was "legislative laziness."

"The time is fast approaching," the spokesman said, "when the oil industry can't afford to pay additional taxes," and estimated that 58 per cent of taxes paid to the Oklahoma Tax Commission come from the oil industry.

The veterans' bonds bill would cost $100,000,000 to finance.

The Kansas bill would give the state corporation commission power to curtail the flow of natural gas to other states whenever the commission considered such action necessary to prevent undue hardship to Kansas citizens.

One of the bill's authors, Rep. Pat Warnick of Wichita, said it is aimed at preventing gas shortages which could cause closing of industries and schools as during the recent cold weather.

ECONOMICS

Imports Record

All-time high for crude, products set in December

IMPORTS of crude and petroleum products reached a new all-time high in December with a daily average of 933,000 bbl., according to data of the Department of Commerce. The previous record was 886,000 bbl. daily, reported for both January and October last year.

The December average represents an increase of 66,000 bbl. daily or 7.6 per cent over November and 139,000 bbl. daily or 17.5 per cent over December 1949.

Crude imports averaged 490,000 bbl. daily for December compared with 442,000 bbl. daily for November and with the record of 534,000 bbl. daily set in January 1950.

Resid.—The new high in December was due to a further increase in im-

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Dec. 1950	Nov. 1950	Dec. 1949
Crude—			
Mexico	1,100	830	592
Colombia	1,339	1,322	1,031
Venezuela	8,118	8,198	9,653
Kuwait	2,864	2,276	1,984
Saudi Arabia	1,763	641	723
Other	1	2	.....
Total crude	15,185	13,269	13,983
Daily average	490	442	451
Products—			
Residual fuel	12,689	11,778	10,057
Other products	1,057	957	584
Total products	13,746	12,735	10,641
Daily average	443	425	343
Total all oils	28,931	26,004	24,624
Daily average	933	867	794

EXPORTS*
(Thousands of barrels)

	Dec. 1950	Nov. 1950	Dec. 1949
Crude	2,917	3,229	2,722
Gasoline	2,104	1,476	1,605
Distillate	795	901	416
Residual	1,326	1,071	751
Lube oils	1,426	1,222	1,296
Other products	801	826	592
Total all oils	9,369	8,725	7,382
Daily average	302	291	238

*Excludes shipments to territories.

ports of residual fuel. The average for December was 409,000 bbl. daily, a gain of 16,000 bbl. daily over the previous record established in November.

Exports for December, excluding shipments to territories, averaged 302,000 bbl. daily. Only in 2 months of 1950 did the daily average go above 300,000 bbl. daily. The first was in October when crude exports were abnormally high. The December increase came through gains for gasoline, residual, and lube oils.

INDUSTRY AFFAIRS

L.P.G.'s Future

Increased demand indicates bright outlook but problems must be solved before industry is stabilized, report shows

INCREASED demand for liquefied petroleum gas indicates a bright long-term future for the industry, but problems relating to its rapid growth need to be solved before stabilization is achieved, according to John C. Winger of Chase National Bank, New York City, in a report on the L.P.G. industry.

Growing pains are responsible for the problems of oversupply, limited storage facilities, seasonal demand, and production rates, but Winger predicted that the industry, already taking steps to minimize these negative effects, will come up with sound solutions.

Storage capacity.—A pent-up demand for L.P.G. at the end of World War II has since been offset by the additional productive capacity resulting from conservation measures in Texas and the subsequent flooding of the market has been reflected in a weak price structure, Winger said.

The oversupply problem is greatly aggravated by the lack of storage capacity and although there is a pronounced seasonal demand during the winter months, the summer production is frequently sold at distress prices.

The high vapor pressures of L.P.G. necessitate its being stored under pressure which tremendously increases the cost of storage facilities, the report stated. In the large consuming areas only 4 to 8 days' supply is kept on hand. However, recent experiments with underground reservoirs indicate that this difficulty may soon be eliminated.

Storage limitations.—Storage limitations are the main bottleneck to the entire industry, for transportation facilities would be increased if L.P.G. could be transported the year around and stored in large reservoirs. But under present seasonal conditions, transportation becomes a costly, uneconomical feature in the industry, Winger said. However, an increased use of L.P.G. in farm tractors may help to reduce the extremes of high-production and low consumption now prevalent in the summer months.

Many uses.—L.P.G. has been extending into industrial applications to such an extent that household and farm consumption, which used to account for all of the L.P.G. demand, and while now at record high levels, accounts for less than half of the total production, the report revealed.

Chemical industries utilize L.P.G. both as a raw material and for solvent purposes and a sharp increase of demand is anticipated with the reactivation of synthetic-rubber plants.

With current military requirements expanding the demand for L.P.G. in aviation gasoline and automotive fuels, and with its increasing use in internal-combustion engines, Winger reported that L.P.G. should find itself in greater demand in the coming years.

The use of L.P.G. in internal-combustion engines is one of the most promising markets and this is borne out by the many bus and truck fleets which are converting to L.P.G. Its main advantages are longer engine life, cleaner engines, better combustion, no gum or lead deposits, and its use with high-compression engines.

Demand.—Future demand and supply of L.P.G. will naturally be governed somewhat by international conditions affecting the supply of material and other fuels. However, the general trend seems to indicate a stimulating effect on the use of L.P.G., Winger declared.

It is expected that the demand, which increased by 177 per cent in the past 5 years, may increase by 82 per cent in the next 5 years from the current rate of 231,000 bbl. per day to 420,000 bbl. per day.

In spite of this increased demand, L.P.G. still accounts for only 4 per cent of the total demand for petroleum products.

The demand for L.P.G. has been increasing at a more rapid rate than the demand for natural gasoline, as such, and it is believed that new plant construction will emphasize the production of L.P.G., Winger said.

Industry reports indicate that new plants put on stream during the early months of 1950 have boosted daily capacity to over 700,000 bbl. per day and there are several new plants under construction with more expected to be built in conformance with conservation requirements, he stated.

TABLE 1—SALES OF L.P.G. IN THE UNITED STATES FOR FUEL AND CHEMICAL USE, YEARS 1926-1950

Year	Total sales, bbl. per day	Change from previous year: Bbl. per day	Change from previous year: Per cent
1926	30	.....	...
1931	1,877	+ 702	+59.7
1936	6,938	+ 1,925	+38.4
1941	30,193	+ 9,799	+48.0
1942	38,189	+ 7,996	+26.5
1943	44,047	+ 5,858	+15.3
1944	68,967	+24,920	+56.6
1945	83,285	+14,318	+20.8
1946	111,172	+27,887	+33.5
1947	144,149	+32,977	+29.7
1948	178,038	+33,889	+23.5
1949	185,036	+ 6,962	+ 3.9
1950 (est.)	230,952	+45,952	+24.8

TABLE 2—PRINCIPAL USES OF L.P.G. YEAR 1949

Use—	Volume, 1,000 bbl. per day	Distribution (%)
Domestic	106.2	48.1
Chemical	35.5	16.1
Refinery use	32.3	14.6
Gas manufacturing	15.6	7.1
Synthetic rubber	11.6	5.2
Industrial	10.6	4.8
Internal combustion	5.1	2.3
Exports	3.5	1.6
Others	0.6	0.2
Total	221.0	100.0

TABLE 3—L.P.G. PRODUCTION COMPARED WITH TOTAL NATURAL GAS LIQUIDS PRODUCTION, YEARS 1945-1950
(Excludes refinery production)

Year	Thou. bbl. per day: Natural gasoline*	Thou. bbl. per day: L.P.G.	Thou. bbl. per day: Total nat. gas liquids	Relation of L.P.G. to total (%)
1945	215	92	307	30.0
1946	225	92	317	29.0
1947	239	123	362	34.1
1948	257	144	401	35.8
1949	270	158	428	36.9
1950 est.	295	197	492	40.0
Change 1950 from 1945 per cent	+37.2	+114.1	+60.3	....

*Includes mixtures, condensate, naphtha, etc.

Prices.—The outlook for prices for 1951 is that while they will run the seasonal cycle of high in the winter and low in the summer, their over-all range will be somewhat higher than for 1950 due to aviation gasoline and synthetic-rubber demands.

Winger concluded that unless storage facilities are expanded more rapidly than anticipated the same cycle will be repeated in 1952, but thereafter it is felt that the demand will have increased to such an extent that supply and demand will have reached a reasonable balance with less seasonal pressure on prices.

Tubular Tieup

Texas Gulf official cites troubles in getting goods

Dahl M. Duff

NEW YORK.—The current difficulties of one of the smaller producing companies in obtaining adequate supplies of tubular goods were related here last week.

In a talk before the New York Society of Security Analysts, W. H. Hendrickson, vice president and treasurer of Texas Gulf Producing Co., Houston, said the company plans to drill 46 wells this year, but that completion of this program depends on the pipe supply which is now "very rough."

The company recently contracted for 1,000 tons of 5½-in. J-55 casing from Dusseldorf, Germany. He said there is good pipe abroad, and that the company would buy more of it if it could.

News encouraging.—Hendrickson said the news from Washington in regard to the allocation of steel for pipe is encouraging but added that "these things move slowly and it will probably be the fourth quarter before we know where we stand." Even if there was no defense effort, pipe would be hard to get because of the increased program of the industry. Various other producing companies in Houston are experiencing the same difficulty in meeting their pipe needs, he said.

Commenting on the industry outlook, Hendrickson said demand for oil is continuing to increase but costs are also up and it is getting hard to find oil. The company's engineering department recently estimated drilling costs are about 25 per cent higher than they were over the last 2 or 3 years. He said any reduction in the depletion allowance would certainly be ill advised at a time when the Secretary of the Interior is asking the industry to study the possibility of increasing reserve producing capacity by 1,000,000 bbl.

Operations reviewed. — Hendrickson gave a review of the company's 1950 operations and its program for the coming year. The 46 wells to be drilled is the same number as in 1950. Of the 46 wells planned for this year, 18 are to be exploratory. In the south TXL area of Ector County, Texas, where the company now has 6 wells, 10 more are planned this year. This will give 16 wells on the 920-acre tract with 12 net wells to Texas Gulf Producing. The company plans six wildcats in the Midland basin on different prospects.

Texas Gulf Producing will take part in the greater activity anticipated this year in the Louisiana coastal area in St. Marys, Terrebonne, and Lafourche parishes. The gas potential is considered to be enormous, Hendrickson said, and although the wells are expensive, they will pay out satisfactorily with a favorable load factor. The company plans three deep tests together with Union Producing Co. as the operator. Two exploratory wells are scheduled with Pan American Producing Co. at Lake Long.

Canadian work. — The company holds a 20 per cent interest in a joint exploratory venture over 11,000,000 acres in Saskatchewan with Standard Oil Co. (Ohio) the operator. The work is being carried out as rapidly as possible, even during the winter, in order to meet the time limit of the permits.

Properties Are Exchanged

Continental Oil Co. and Union Oil Co. of California have concluded an exchange agreement whereby Union has transferred to Continental all of its interest in certain properties in Wyoming and Colorado. Some property in Louisiana also is affected.

The properties, which were formerly jointly owned, and operated by Continental, are in Circle Ridge, Maverick Springs, Lance Creek, Lake Creek, North and South Sunshine fields in Wyoming; and in Douglas Creek and Thornburg fields in Colorado. Also included is property in East Moss Lake field of Louisiana.

In exchange, Continental has transferred to Union a portion of its total interest in Kettleman Hills field and Huffman and Western States gasoline plants, all in California.

Ringwood Facilities Planned

Oklahoma Natural Gas Co. and Warren Petroleum Corp. will construct a gathering system, compressor station, camp and related facilities, and a gasoline plant in Ringwood field of Major County, Oklahoma, Joseph Bowes, O.N.G. president, and W. K. Warren, president of Warren Petroleum, disclosed this week.

The joint project termed a step in conservation of Oklahoma's natural resources, will gather and process natural gas being produced with oil in Ringwood. It will process 50,000,000 cu. ft. daily, delivering it to O.N.G.'s pipe-line system at 750 psi., and will manufacture 80,000 gal. of gasoline, butane, and propane a day.

The gathering system for the plant will include 45 miles of pipe. The plant will operate with three stages of compression, with power capacity of 12,500 hp. Construction will begin as soon as material can be procured, and it is expected the plant will be in operation late this year or early in 1952.

The conservation project was made possible, Bowes and Warren said, through cooperation of Superior Oil Co. of California, Mazda Oil Corp., Kewanee Oil Co., Coronada Oil Co. of Delaware, Deardorf Oil Corp., Trigg Drilling Co., Inc., and other Ringwood pool operators.

O.N.G. will build 28 miles of 12-in. line to connect the plant with its natural-gas-transmission system near Enid, and will replace 18 miles of 8-in. line south of that city.

Petrochem Branch

Sinclair Oil sets up new division to expand output

NEW YORK.—Reflecting the growing interest of integrated oil companies in the field of petrochemical manufacture, Sinclair Oil Corp. has announced the formation of a petroleum-chemicals division which will operate as part of Sinclair Refining Co.

P. C. Spencer, president, said that in addition to taking over present Sinclair activities in the petroleum-chemicals field, the new division will proceed at once with expanded operations in market analysis and sales planning for new production in cooperation with specialists of the manufacturing and research departments.

Present work.—Sinclair is now engaged in synthesizing a limited number of petrochemicals, including xylene, aromatic solvents, and three detergents, the oil-layer-type petroleum sulfonates, in ammonium barium, and calcium salts. Initially the new division will specialize in these petroleum fractions and petrochemicals now manufactured in the solvent, lubricating-oil additive, demulsifying agent, and sulfonate lines.

The company decision to enlarge petrochemical activity is prompted by the economics of upgrading relatively low-value refinery-fuel-gas constituents and other petroleum fractions and byproducts, and by the increasing shortage of basic chemical raw materials for manufacture of plastics and synthetic rubber—a shortage which will be intensified by increasing defense production.

John A. Scott, formerly assistant to E. W. Isom, vice president in charge of research and development, has been named to head the new division.

Socony's 1950 Operations

The 1950 operations of Socony-Vacuum Oil Co., Inc., are estimated by the company as follows (figures in thousands of barrels and referring to the year's total): domestic—product sales, 194,340; refinery runs, 172.800; gross production, 75,600; foreign—product sales, 35,145; refinery runs, 34,167; and gross crude production, 50,905.

These figures, presented in a recent talk in New York by B. Brewster Jennings, Socony-Vacuum president, were incorrectly listed in *The Oil and Gas Journal, February 8, 1951, page 59*, as being in barrels daily.

EUROPE

Romanian Production

Crude output has increased by 140 per cent since oil industry nationalization in 1948, legation claims

Bertram F. Linz

ROMANIAN crude production has increased by 140 per cent since the petroleum industry was nationalized in June 1948, and the Communist government aims, under its first 5-year plan which began January 1 of this year, at a further increase of 16.7 per cent in 1951, according to the Romanian Legation in Washington.

On the basis of prenationalization figures, the Romanian claim would indicate a 1950 production of anywhere from 100,000 to 125,000 bbl. daily, but these figures are questioned in official circles in Washington where the output is believed actually to be in the neighborhood of 85,000 bbl. daily.

The legation's statement, based on an article by Horatiu Tancu, assistant secretary of the mining and petroleum industries, disclosed that under the 5-year plan crude production is to reach 200,000 bbl. daily in 1955.

Russian equipment.—Expansion of the Romanian oil industry is being carried on with the provision by Russia of machinery and tools. Russia is known to be taking the greater part of the oil for her own purposes, and is estimated to have taken 31,000,000 bbl. last year.

"The notable increase of oil production in these 2 years negated the theory of the so-called 'inevitable decline' of the Romanian oil industry, so much in circulation among foreign investors and Romanian exploiters," Tancu's article said. "Through a steady intensification of geological research, exploratory drillings, through a rational exploitation of new strata, the introduction of new methods, there will be created the conditions for further increases in oil production."

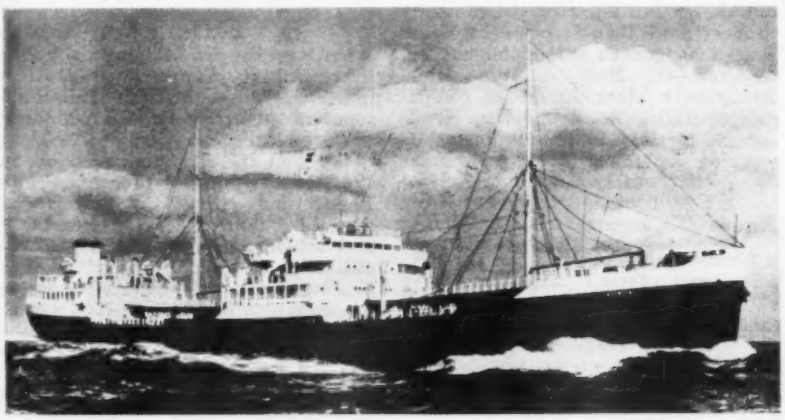
New areas.—Tancu disclosed that oil has been found in several sections of the country other than the Prahava Valley which formerly was the major producing area, and said "new rich strata" have been discovered and drilling or production is under way on Moldavia, Ardeal, and Oltenia.

The 5-year plan calls for the investment of 120,000,000,000 lei in the nationalized oil industry. No exchange rate is set for Communist currencies by the Federal Reserve Board, but for customs purposes the New York Federal Reserve Bank in recent transactions has valued the lei at two-thirds of a cent, on which basis the dollar equivalent of the investment would be $800,000,000.

Five-year plan.—"The practical achievement of the first 5-year plan started at the beginning of its first year, 1951," Tancu wrote. "But conditions for the fulfillment of the plan had already been created during the first 2 years of the planned economy. The present level of drilling work was hitherto unknown in Romania. New drilling installations were put into operation during 1950. Hundreds of new installations, received in major part from the Soviet Union, will be put gradually into operation during the 5-year plan; many of these installations will be made during 1951. In the regions where the former managers did not seek to increase production, oil-drilling activity is 10 times greater than in 1948; and important perspectives are opened for the development of powerful oil regions, elsewhere than in the Prahava Valley."

Workers increase.—During the 5-year plan, 5,000,000,000 lei will be invested for raising the living standards of oil workers, it was stated. The number of workers will increase by 33 per cent and the average wage by 37.7 per cent.

"It must be recalled that the basic factor which enables the RPR (Romanian Peoples Republic) today to carry out the provisions of the 5-year plan in the oil industry is the continuous, fraternal help of the Soviet Union, through the creation of the 'Sovrom-petrol' organization, through the delivery of machinery and tools not yet manufactured in Romania, through the collaboration of Soviet scientists and technicians with the Romanian specialists, through the adoption of Soviet methods of work and organization," Tancu concluded.



Ship to Use Gas-Turbine Engine

This Shell tanker, the Auris, will soon be equipped with a marine gas-turbine engine, the first to be installed in a commercially operated merchant vessel. Tests will begin soon at the Rugby, England, works of British Thompson-Houston. While details of the gas turbine have not been released, it is rated at 1,200 hp., and is to be installed as a prototype for a unit of 6,500 hp., replacing one of the ship's existing engines operating on fuel oil. The existing engines are four Hawthorn-Sulzer 8-cylinder, single-acting, airless-injection, supercharged units of 1,105 b.hp., which are directly coupled to B.T.-H. double-unit-type, 830-kw., 3-phase, 50-cycle, 1,600-volt alternators. Propulsion motor is a B.T.-H. single-unit type of 3,750 hp. at 120 r.p.m.

Production Goal Not Met

A broadcast heard over the Bucharest radio by American monitors last week indicated that Romanian crude-oil production has not reached its goals since properties were seized from Anglo-American interests. This report is contradictory to the official statement released by the Romanian legation in Washington that petroleum output had increased by 140 per

cent since the industry was nationalized in 1948.

Citing a record number of mechanical breakdowns, accidents, absenteeisms, and leaves as factors contributing to lagging production, a directive was issued by the Romanian Government ordering bonuses to be paid and more clothing ration cards issued as incentives to workers in an effort to alleviate the situation.

The directive was also signed by the Romanian Communist Party's central committee.

Dollar-Oil Problem

Jersey Standard, British reach long-term agreement

Dahl M. Duff

STANDARD OIL CO. (N. J.) announced this week it had reached a new agreement with the British Government designed to provide a long-term solution of its dollar-oil problem in the sterling area.

In London, the House of Commons was told that an agreement also had been reached with Socony-Vacuum Oil Co., Inc. These two agreements, with others signed previously, bring to an end the controversial British policy of substituting sterling for dollar oil in sterling-area markets.

As a result of negotiations just concluded in London, the British Government has given assurances that the Jersey affiliates will be accorded full equality of treatment in the sterling area with British and British-Dutch oil companies.

The Jersey company in return will take steps for a decrease in the net amount of dollars required for the oil sales of its affiliates in the sterling area in the future.

Steps taken.—Among the steps being taken to implement this agreement, the company said, are the following:

1. Purchase of a substantial amount of oil from sterling sources.
2. Advancement of the completion date of the Fawley refinery.
3. Proceeding with the second phase of this refinery construction to provide tractor-fuel and lubricating-oil production. The entire project to be completed by 1954 will result in additional dollar savings.

The company has also agreed to keep to a minimum, by all reasonable means, the dollar costs of tankers required for its trade within the sterling area. Two 26,500-ton tankers are on order with Vickers-Armstrong Co., and early in January, Anglo-American Oil Co., Ltd., Jersey Standard's British affiliate, asked for bids from British shipyards on four other vessels.

Middle East crude.—Jersey Standard said that by 1954 when all provisions of the new agreement are implemented, nearly all the petroleum requirements of the company's affiliates in the United Kingdom will be met by importing Middle East crude for sterling and refining it locally.

The Jersey Standard agreement marked another and apparently one of the final steps in the solution of the dollar-oil problem. Several other sterling-utilization agreements have been signed over the last year by other companies, including Standard-Vacuum Oil Co., Arabian American Oil Co., and California Texas Oil Co., Ltd. The Jersey company itself last May negotiated a temporary agreement to meet increased requirements from gasoline derationing in the United Kingdom for sterling payment.

This earlier agreement with Anglo-American covered only the period up to the completion of the Fawley refinery late this year. The steps which Jersey Standard has agreed to take under the new agreement in general will carry out earlier-known plans of the company.

Purchase deal.—The purchase of a substantial amount of crude from sterling sources will be under a deal made several years ago with Anglo-Iranian Oil Co., Ltd. This agreement, since amended, calls for deliveries commencing next January with Jersey Standard taking about 800,000,000 bbl. of Iranian and Kuwait crude over a 20-year period. It is tied into the 24.7 per cent interest which Jersey Standard holds in the Middle East Pipelines, Ltd., project for a line to the Mediterranean.

The Fawley refinery near Southampton which will use this crude is now under construction. The first phase will give a capacity of 110,000 bbl. daily, thus allowing the company to meet more than 25 per cent of the United Kingdom's anticipated market requirements from its production. Along with other American companies operating in the Eastern Hemisphere, Jersey Standard has been working for some time to minimize its dollar outlay by purchase of tankers and other equipment from European sources.

Socony agreement. — Socony-Vacuum and Jersey Standard have agreed that the dollar content of their oil would be reduced progressively to the average gross dollar content of oil produced by British companies, according to the statement of a ministry of fuel and power official in the House of Commons. This sterling-oil dollar content is about 30 per cent of cost.

Restrictions are thus lifted on sales of oil by the two American companies. Howard Page, Jersey Standard's representative in the United Kingdom, said the agreement amounted to free convertibility of sterling as far as oil is concerned.

Socony-Vacuum said it would reduce the dollar content of oil sold in the sterling area by importing sterling oil from the Middle East in nondollar tankers to its refinery under construction in England taking sterling for a large part of its supplies to British Commonwealth areas, and purchasing substantial quantities of oil from British and European producers for sale outside the sterling area. Socony-Vacuum also has a share in Middle East Pipelines, Ltd., and is a partner with an English company in a 20,000-bbl. daily refinery being built at Coryton.

MIDDLE EAST

Oil-Area Protection

How to hold Middle East discussed by U. S., Britain

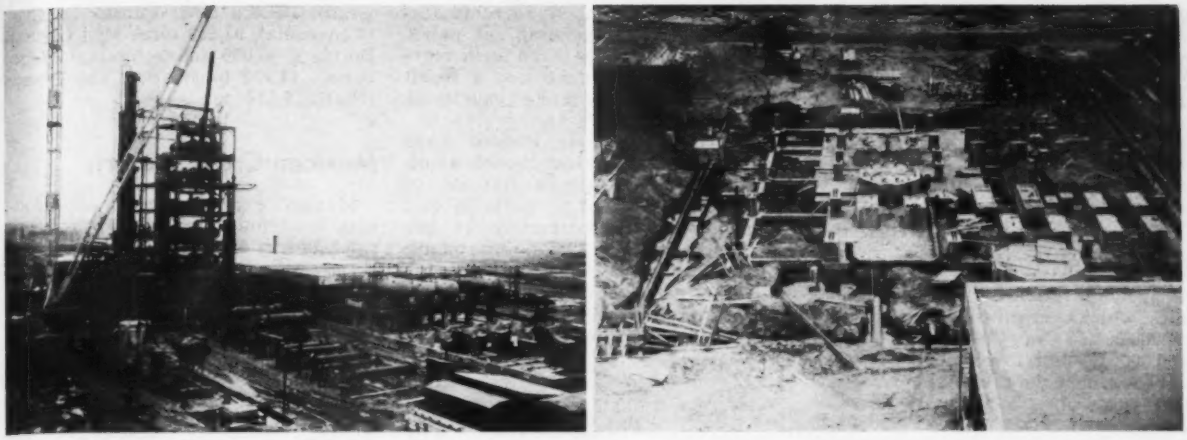
PROTECTION of the Middle East oil fields has become a matter of concern on both sides of the Atlantic, it was disclosed last week.

British and United States officials have been discussing the matter in London and the outcome of the talks may be the establishment of American bases in the Middle East area. In Washington, Ruben Kelf-Cohen, British undersecretary of fuel and power, conferred with George C. McGhee, assistant secretary of state for Near Eastern affairs, on oil matters of mutual interest but said the question of Iran was touched upon only in a general way.

McGhee touched upon the Near East situation recently in an address before the World Affairs Council of Rhode Island in which he emphasized the strategic importance of that area and South Asia.

Area long sought.—Pointing out that every military conqueror from Alexander the Great to Hitler has sought to dominate the Near East, McGhee declared "there is not the slighest doubt that the scheming dictators in the Kremlin plan to take over, subjugate, and exploit the human and physical resources of the Near East and South Asia," but added "there is still time to build up their defenses against aggression while the Russians are committed elsewhere."

Explaining that over half of the world's known supply of oil lies in Saudi Arabia, Iran, Kuwait, Iraq, and other Near East countries from which 20 per cent of the world's production now comes, McGhee said that the industries of Europe "would grind to a fatal stop" if they were deprived of oil from the Near East, and because of our dependence on that area for natural rubber, graphite, chrome, manganese, and other essential materials and for strategic materials from Africa which move through the Near East "our own life and our own future are closely bound with that of the peoples and the lands of the Near East and Asia."



Belgian Refinery Under Construction

These two scenes illustrate progress being made on the new 30,000-bbl. daily refinery currently under construction at Antwerp, Belgium, by Soc. Industrielle Belge des Petroles. The company is owned jointly by Anglo-Iranian Oil Co., Ltd., and the Belgian company, Petrofina. The refinery is being built by Kellogg International Corp. refinery and chemical engineers. The photos show the process section and foundation work as they appeared early in the fall. The plant is scheduled for completion the latter part of this year. It is located on a site adjacent to the Scheldt River and will have crude-distillation and combination cracking facilities.

Turkey Plans Refinery

Only 50 to 60 tons daily are now reported being produced from Ramandag field in Turkey but planning continues for a 3,000-bbl. daily refinery which would utilize more fully the field's potential.

Present production is refined in a small experimental topping unit of about 1,400 bbl. daily capacity located near the field at Batman. Production includes minor quantities of gasoline and kerosine.

The Ramandag crude of 20°-gravity is heavily asphaltic, and the present daily production of about 30 tons of asphalt is taken by the Turkish Highway Administration. The current crude output of the field is equivalent to 350 to 400 bbl. daily. Ramandag, in southeastern Turkey, was discovered in 1948.

Reserves of the field have been estimated officially at from 10,000,000 to 20,000,000 tons (67,000,000 to 135,000,000 bbl.), and potential production at approximately 3,000 bbl. daily. The operation is carried out by the government's Mining Research Institute which also is exploring elsewhere in the country.

The refinery which Turkish officials plan to construct would cost the equivalent of about $5,500,000. The production of products would allow an annual foreign-exchange savings in the country of more than $4,000,000.

Oil Investments Decline

Virtual completion of the foreign expansion planned by the petroleum industry for the immediate postwar years was a primary factor in a moderate decline in United States oil investments abroad last year, the Office of Business Economics of the Department of Commerce said last week.

However, the OBE said present plans of the industry call for continued investments, although probably on a reduced scale, for refineries in the Middle East and Western Europe, and in developing the relatively new oil discoveries in Canada.

Figures on U. S. foreign investments in 1950 are not yet available, but the OBE reported that American corporations invested $1,300,000,000 in foreign branches and subsidiaries in 1949, an all-time record which brought total foreign investment to $12,500,000,000 at the end of that year.

A little more than half of the 1949 foreign investment was covered by the $700,000,000 reported for the petroleum industry, representing expenditures to carry forward major postwar projects such as refinery facilities in Venezuela, pipe lines in the Middle East, and the building up of foreign flag tanker fleets.

Baghdad Refinery Planned

The Iraqi Government is now seeking to work out arrangements for the construction of a medium-capacity refinery in the Baghdad area.

The government-owned plant has been in various stages of planning for more than 3 years. Recent reports from the Iraqi capital, however, indicate more definite progress toward realization of the project.

The Iraqi Government has announced a new law under which the Ministry of Economics will be able to build the refinery. In December, the National Bank of Iraq agreed to provide £2,000,000 for the project with the government putting up the balance amounting to £4,000,000 to £5,000,000.

As presently planned, the refinery would have a capacity of about 24,000 bbl. daily and would make unnecessary further products imports from the Anglo-Iranian Oil Co., Ltd., refinery at Abadan in Persia. The Iraqi Government refinery will be built to specifications prepared to M. W. Kellogg Co., according to the Baghdad reports.

Presumably the refinery would be operated with crude from the Iraq Petroleum Co., Ltd., companies. The associated Basrah Petroleum Co., Ltd., is expected to begin commercial production of between 25,000 and 50,000 bbl. daily next year.

At present, Iraq's domestic needs are met from Abadan and from the 8,000-bbl. daily topping unit at Alwand of Khanaqin Oil Co., Ltd. (Anglo-Iranian). I.P.C. operates a 1,500-bbl. daily capacity topping unit at Baba Gurgur. In Baghdad, it was said it would be about 3 years before the government-owned refinery is completed.

LATIN AMERICA

Output Can Be Increased

Venezuela can increase its present production of 1,600,000 bbl. daily of oil by 400,000 bbl. from present fields and wells with only a relatively little new drilling, Dr. Antonio M. Araujo, new ambassador to the United States, told The Oil and Gas Journal last week.

Araujo said that so far termination of the Mexican trade agreement and reinstitution of the quota provisions of the agreement with Venezuela has

had no effect on the petroleum industry but he entertained doubts as to what might develop when Venezuela's quota of tax-cut imports into the United States is filled. When that occurs, it was indicated, Venezuela will have to cut her exports or, if the United States needs the oil, it will have to pay a higher price to absorb the additional 10½-cent tax.

The ambassador made it clear that the reciprocal-treaty situation has not affected his government's relations with the American oil companies, which account for approximately $1,300,000,000 of the nearly $2,000,000,000 foreign investment in Venezuelan oil. At the present time 15,000,000 acres of oil lands have been placed under concession, but there is another 70,000,000 acres of potentially valuable land yet to be developed, he said.

The government now, after lengthy tests of iron-ore reduction with gas in Sweden, is planning to go ahead with construction of a steel plant near extensive iron deposits in eastern Venezuela and close to the eastern oil wells, from which a pipe line will be laid to carry natural gas to the plant. The cost of the plant, development of hydroelectric power and the gas transmission line is estimated at $120,000,000.

The staff of the embassy will shortly be increased by the arrival of Dr. Jose Martorano Battisti to serve as counselor for petroleum affairs.

Fuel Price Boosted

Argentina acts to offset increased transport costs

THE Argentine Government has increased the price of motor fuel sold in the country by nearly 70 per cent in order to reduce the heavy losses of Yacimientos Petroliferos Fiscales, the state-owned oil organization.

The increase was from 60 centavos to 1 peso per liter. The new price is equivalent to about 27.5 cents a gallon, based on the free rate of the Argentine peso.

Regulations published in Buenos Aires by the Ministry of Industry and Commerce said that the increase was necessary to offset higher transportation charges and increased costs of imported equipment. It added that the old price of motor fuel was considerably below production costs of the product.

Other products.—The price of other petroleum products in Argentina was increased correspondingly except for kerosine, which is extensively used for domestic purposes.

With domestic production little changed the last 2 or 3 years at between 60,000 and 65,000 bbl. daily, Argentina relies heavily on imports to meet well over half of its requirements. In Argentina as in other foreign countries depending on petroleum imports, prices have been moving up in recent months as a result of the sharp rise in tanker chartering rates.

Figures reported in Buenos Aires for October, the latest month available, show Argentina's imports of crude and principal products in that month were approximately 14 per cent over the corresponding month a year earlier.

Argentine imports were as follows (figures in tons):

	October 1950	September 1950	October 1949
Fuel oil	175,162	305,058	212,535
Crude	264,828	229,699	155,230
Diesel	721	1,020	6,063
Gas oil	.....	.....	2,387
Naphtha	2,498	.....	8,716
Kerosine	.....	.....	3,920
Total	443,209	535,777	388,851

British sources.—The larger part of these October imports came from British production sources. Argentina and Britain have reciprocal trading arrangements, but in recent months the British have refused to pay prices asked by the Argentine's for their meat. Sterling-oil prices, which in the world market are based on quotations in dollars, automatically advanced when the pound was devalued.

Of the October imports, diesel oil and naphtha came from Curacao which also supplied all the fuel oil except for 15,403 tons from Abadan. Imports of crude were loaded at the following ports: Bandar Mashur (Iran), 104,402 tons; Puerto La Cruz (Venezuela), 91,259 tons; Miri (British Borneo), 45,060 tons; Amuay (Venezuela), 14,570 tons; and Cabo Blanca (Peru), 9,537 tons.

Mexican Crude Exports

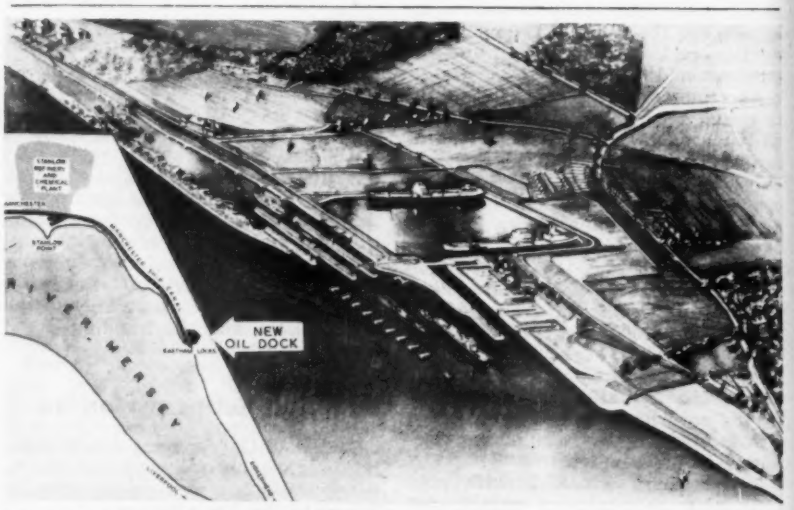
Mexico's exports of crude and products are continuing at a rate considerable in excess of last year.

December exports totaled 2,290,600 bbl., or an average of 73,890 bbl. daily. This compares with 1,567,271 bbl., averaging 50,500 bbl. daily (excluding bunkers) in December 1949.

The stepped-up rate of exports is even greater percentagewise than the expansion in crude production over the last year. Mexico's December output was approximately 228,000 bbl. daily against 180,000 bbl. daily in December 1949.

By products, Mexico's December exports were: fuel oil, 264,600 bbl.; Poza Rica crude, 1,608,000 bbl.; Panuco crude, 210,600 bbl.; Naranjos crude, 70,100 bbl.; gas oil, 106,600 bbl.; and gasoline, 30,700 bbl.

The December exports by purchasers included: Sinclair Refining Co., 1,051,800 bbl.; Sinclair Cuba, 71,800 bbl.; Eastern States Refining Co., 726,800 bbl.; A. Johnson & Co. (Sweden), 71,100 bbl.; N. V. de Bataafsche Petroleum Mij. (Shell) 146,700 bbl.; Cities Service, 62,900 bbl.; Anglo-Saxon Petroleum Co., Ltd., (Shell), 106,600 bbl.; and Florida Power Co., 21,700 bbl.



New British Oil Dock Under Construction

The largest oil dock in Britain which will be connected by a 7-mile, 16-in. pipe-line system to Shell's expanded Stanlow refinery is being built at Eastham in Cheshire by Manchester Ship Canal Co. Shown here is a sketch of the dock with the map at left giving its location in relation to the Mersey River, the refinery, and the Manchester Ship Canal. The dock will accommodate up to four tankers of 30,000 dwt. and is due for completion in mid-1952. From each tanker berth discharge facilities of the most modern type will feed into the new 16-in. line which will be laid along the canal bank to the refinery. Shell will also build a new tank farm a short distance outside the dock area. Work on the new dock began following the passage last year of a special act of Parliament authorizing the undertaking.

XUM

How

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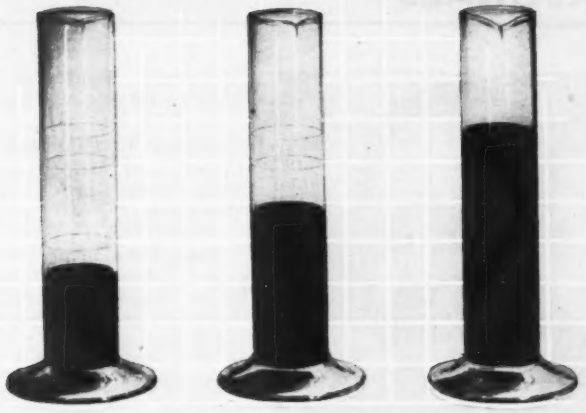

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XUM

PERSONALS

New Appointment

Long named executive vice president of Texas Co.

AUGUSTUS C. LONG, vice president in charge of foreign operations in the Eastern Hemisphere for The Texas Co., has been elected executive vice president of the firm.

Born on August 24, 1904, Long attended Marion Institute, Marion, Ala., and was graduated from the U. S. Naval Academy in 1926, after which he served approximately 4 years in the Navy.

He joined Texaco on January 1, 1930, as a service-station supervisor for the domestic-sales department in Florida, later becoming representative in that state.

Transferred to the export department in May 1931, he served as general manager in Ireland for 3 years, then as manager of the Dutch subsidiary in The Hague. Returning to the United States in 1940, he was appointed assistant to the manager, central territory, domestic sales.

On January 1, 1945, Long became manager of the foreign-sales division in New York and was appointed assistant to the vice president in charge of foreign operations the following year. Following nearly 2 years as vice president of California Texas Oil Co., Ltd., in charge of marketing west of Suez, he returned to the parent company in November 1948 as assistant to the chairman of the board of directors. He was elected a director of the company in August 1950.

Gerald L. Bell, recent graduate from Ohio State University, has joined International Petroleum Co., Ltd., at Talara, Peru, as geologist.

Gordon E. Hillhouse, engineer for Sunray Oil Corp., has been transferred from Snyder, Tex., to Lewisville, Ark.

Jesse Miles, main-line maintenance superintendent for Portland Pipe Line Corp., has been transferred from Portland, Me., to Gorham, N. H., in the same capacity.

Clifford L. Mohr, geologist with Exploration Contractors, Inc., returned recently to the New York offices of the company after spending several weeks on preliminary geological reconnaissance in Spain.

Quinton Walton, tool pusher for Kerr-McGee Oil Industries, Inc., has been transferred from Cheyenne, Wyo., to Harlowton, Mont.

R. L. Aycock, vice president for Pan-Am Southern Corp., has been placed in charge of supply and transportation. **W. R. Remalia** will be manager of supply, reporting to Aycock, and will coordinate refinery production and product purchase arrangements. **John E. Monroe,** general traffic manager, will be in charge of distribution, and will also have charge of all terminals and product pipe-line arrangements.

Joseph Washco, supervisor for Gulf Oil Corp. at Morton, Pa., has been transferred to Girard Point, Philadelphia.

Ralph O. Rhoades, Gulf Oil Corp., has been appointed to the newly created position of executive assistant to the vice president on the staff of the production department in Pittsburgh. Rhoades received a B.A. degree in geology from Stanford University in 1922, and joined Gulf in 1926 as a geologist in South America. Subsequently he has served the firm in the Middle and Far East and in London. He was transferred to Pittsburgh in 1940, and rose from geologist to staff geologist and chief, land and exploration branch. Effective with Rhoades' appointment the title of staff geologist has been discontinued and **B. F. Hake** has been appointed chief of the land and exploration department.

Rouse Simmons, formerly vice president in charge of exploration for Basin Oil Co., Los Angeles, has been elected president and general manager of Bolsa Chica Oil Corp. He succeeds **Thomas W. Simmons,** who resigned the presidency, but continues as director.

D. B. Hutchinson, Shell Pipe Line Corp., has been assigned to the position of chief inspector with headquarters in Venezuela, where he will assist in the construction of the projected pipe line to be built from Maracaibo to the Paraguana Peninsula. Others transferred to Shell Caribbean Petroleum Co. in Venezuela are: **Sealy R. M. Lytle,** pipeline-maintenance foreman at Sarcoxie, Mo., and **Tim McGregor,** area maintenance supervisor at Springfield, Mo. Both men will serve as chief inspectors. **S. L. Stevens,** senior clerk at the Texas Gulf area office, will serve as equipment-maintenance supervisor. **J. B. Churchwell,** engineer, Texas Gulf area, has returned from the South American project where he worked as reconnaissance engineer.

Joseph J. Snyder, treasurer of the Massachusetts Institute of Technology, has been elected a director of Transcontinental Gas Pipe Line Corp.

C. Win Payne, who has been elected president of the Permian Basin Geological Society at Midland, has joined Pure Oil Co.'s Texas producing division at Fort Worth. Others who have joined the department are: **J. Lee Davis,** geophysicist, from Big Spring, Tex.; and **Gregory L. Turner,** geologisit, from Tyler, Tex.

J. R. Atkinson, formerly division manager for Kingwood Oil Co. at Mount Vernon, Ill., has joined C. L. McMahon, Inc., Tulsa, as district manager in the Illinois basin states with headquarters at Mount Vernon. Atkinson, who has been with Kingwood for the past 4½ years, graduated from Oklahoma A. & M. College in 1937. He joined Carter Oil Co. immediately after his graduation, and after 8½ years resigned while serving as district engineer at Great Bend, Kans. He has been president of the Illinois Oil and Gas Association for the past year.

Warren H. Smith, geophysical party chief for The Texas Co. at Corpus Christi, has been transferred to Denison, Tex., in the same capacity.

A. J. Swank has been named manager of general construction for Pacific Gas & Electric Co., supervising the company's many building activities. **F. E. Baxter** has been appointed manager of the department of purchases and stores, succeeding the late Frank R. Sherwood.

PERSONALS

E. L. Reed, Jr., district geologist in Midland, Tex., for Stanolind Oil & Gas Co., has been named to the recently created position of senior staff geologist. He will be succeeded as district geologist in Midland by **Gordon T. Buskirk,** who has been with Stanolind since 1941.

H. J. Struth, petroleum consultant at Dallas, has been retained by the Venezuelan Government as economic adviser on petroleum. He recently returned from Caracas after completing the first annual report on the petroleum industry for Venezuela, which now is being printed in the United States.

Cecil C. Hutchens, Evansville, Ind., is now associated with **George R. Cameron,** of Palm Springs, Calif., as partner and manager of oil properties in the basin.

C. D. Everhart, formerly of the Oil Industry Information Committee office in Philadelphia, has been transferred to the New Orleans office replacing **Don Agnew,** who was recently transferred to the Dallas office.

J. M. Wilson, assistant district superintendent of The Texas Co., has been named district superintendent of the Central district, South Texas division, succeeding **W. F. Batson,** who is retiring. **E. A. Staples,** field foreman, will replace Wilson as assistant superintendent. Other changes include: **T. S. Richards,** production foreman at Palestine, Tex., transferred to Conroe, Tex., as field foreman; **L. W. Goodrich,** production foreman at Chocolate Bayou, Tex., transferred to Palestine in the same capacity; and **J. F. Tindol,** petroleum engineer at El Campo, will be transferred to Dayton, Tex., as production foreman.

E. L. Kimrey, formerly general superintendent of Shell Oil Co.'s Midland, Tex., area, has been named manager of the northern division at Hobbs, N. M., and **C. R. Bickel,** formerly Odessa division manager, has been named manager of the southern division at Odessa, as a result of the production department's reorganization. Division geologists for the exploration department are: **M. J. Deuth,** western division, and **V. W. Rogers,** eastern division.

J. B. Dawson, station chief engineer for Shell Pipe Line Corp. at Basile, La., has been transferred to Fannett, Tex., in a similar capacity. Other transfers include: **W. P. Ellis,** pipe-line maintenance foreman, from Goodrich to Douglas, Tex., in the same capacity; **D. R. Grantham,** station engineer, from Neches, Tex., terminal to Basile as station chief engineer; **G. C. Johnson,** engineer, from Colorado City, Tex., to McCamey, Tex.; **C. C. Moss,** pipe-line maintenance foreman, from Fredericksburg to Port Neches, Tex.; and **G. D. Robertson,** pipe-line foreman, from Opelousas, La., to Fredericksburg in a similar capacity.

J. R. Tusson, formerly with the Whiting, Ind., refinery of Standard Oil Co. (Ind.) has joined Pan-Am Southern Corp.'s general offices in New Orleans as a chemical engineer. He will work on plans for the expansion of Pan-Am's Destrehan, La., refinery.

Joseph W. Moorman has opened a consulting office in Tulsa for serving petroleum and chemical fields, specializing in fluid catalytic cracking, and applications of fluid catalytic techniques to the chemical industries. Moorman was formerly with M. W. Kellogg, and more recently was a member of Marshall-Moorman Development Co. of New York City.

J. E. Kilkenny, formerly with Chanslor-Canfield Midway Oil Co. for the past 11 years, has joined Union Oil Co. of California as senior geologist and assistant to **R. G. Greene,** manager of exploration-Pacific Coast.

Samuel C. Dunlap and **Leavitt Corning** have formed the partnership of Dunlap & Corning and established offices in San Antonio. Dunlap has just completed a wildcat operation in Southwest Texas, and Corning has been actively engaged in South Texas as a consulting geologist for the past several years. He was formerly geologist for Plymouth Oil Co. before entering the consulting field.

Russell M. Riggins, formerly treasurer and a member of the policy-making committee of Phillips Petroleum Co. and its subsidiaries, as well as vice president of its South American companies, has been named president of McCarthy Chemical Corp. and the New Ulm Corp., Houston. **Glenn H. McCarthy** will become chairman of the board of both companies. Other changes include: **Hugh Miller,** vice president in charge of operations of McCarthy Chemical Corp.; **A. G. McNeese, Jr.,** vice president; **Clyde C. Rogers,** formerly with Fish Pipe Line Construction Co., secretary of New Ulm Corp., and assistant secretary of McCarthy Chemical; **John B. Anderson,** secretary of McCarthy and assistant secretary of New Ulm; and **C. K. Carruthers,** formerly with Superior Oil Co., is the new purchasing agent for both companies. In addition to his responsibility of purchasing equipment, he will also purchase gas and distillate for the chemical company's plants at Winnie, Tex.

A. L. Rash, district superintendent for Kewanee Oil Co. at Shidler, Okla., has been transferred to Walters, Okla., in the same capacity.

Bruce M. Sullivan, petroleum engineer in the Houston office for Humble Oil & Refining Co., has been transferred to Tyler, Tex., as division electrical engineer.

R. W. Hofsess, operating engineer for Cities Service Gas Co., has been appointed superintendent of production at Oklahoma City. Other changes in the firm include: **R. C. Jackson,** transferred from Wichita to Oklahoma City as operating engineer; **R. B. Fleske** was named superintendent of gas measurement at Wichita to replace Jackson; **Wayne Coffman** was named assistant superintendent of gas measurement; **Richard Sidwell,** transferred from Hugoton, Kans., to the gas-measurement department in Wichita replacing Coffman as engineer; **Harold Hawley,** transferred from the meter shop at Wichita to Hugoton as meter inspector; and **John Inge,** transferred from the Wichita compressor station to the compressor department at Wichita where he will work on designs and material requirements for compressor-station constructions.

William B. O'Heran, The Texas Co., has been elected president of the Ardmore Geological Society, succeeding **Earl Westmoreland,** of Seaboard Oil Co. Other officers include: **Bob Grieder,** of The California Co., vice president; and **W. B. Armstrong,** Ohio Oil Co., secretary-treasurer.

George H. Bruce, president of Aladdin Petroleum Corp., has been elected president of the Wichita Petroleum Club, succeeding **Thomas H. Allan.** Other officers named were: **Frank Brooks,** El Dorado Refining Co., and **M. C. Harrell,** The Texas Co., vice president; **S. O. Beren,** Mountain Iron & Supply Co., secretary; and **Robert E. Mallonee,** Mallonee Drilling Co., treasurer.

Gene House, gas-measurement engineer for Texas Eastern Transcontinental Corp., has been transferred from Longview, Tex., to Oran, Mo.

Thomas P. Brooks, division superintendent, drilling and production,

XUM

AT CHITWOOD...

BROAD GAS CONSERVATION with multi-service GMV's

Line-up of four Cooper-Bessemer 8-cylinder GMV compressors, rated 880 hp at 300 rpm, in Magnolia Petroleum Company's Chitwood Gasoline Plant. Here, multi-service operation involves 4800 psi discharge in cycling, 1,015 psi in gasoline extraction, 250 psi for vapor recovery. Flexibility is a keynote.

Another Example of Efficient Power at Lower Cost

GMV's in Magnolia Chitwood plant, shown here from crankdoor side.

Exterior view of compressor building at Magnolia's Chitwood plant.

AT THE Chitwood plant, Magnolia Petroleum Company is doing an outstanding job of gas conservation . . . perhaps unique. The operation includes production of distillate by cycling . . . production of gasoline from casinghead gas . . . vapor recovery off of crude at atmospheric pressure . . . and a pressure maintenance operation.

The operation is of particular interest because it involves both high and low pressures, together with the vapor recovery service — all tied into the same compressor units.

As shown opposite and below, the compressors are efficient Cooper-Bessemer GMV Turboflows — chosen partly because they assure the true flexibility so essential in a multi-service operation such as this.

Whether your plans call for complex compressor service or the most simple kind of set-up, you'll be ahead with Cooper-Bessemer V-Angles. Then you'll be sure of economical installation, prolonged, low-cost performance, and the *flexibility* to meet fixed or variable requirements precisely. Better check with Cooper-Bessemer.

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Odessa, Texas Seattle, Wash. Tulsa, Okla. Shreveport, La.
St. Louis, Mo. Los Angeles, Calif. Chicago, Illinois Caracas, Venezuela

PERSONALS

for Southern Production Co., Inc., has been transferred from Shreveport to Norman, Okla.

W. B. Glenn, district superintendent for Transcontinental Gas Pipe Line Co. at Des Moines, has been transferred to Newark, N. J.

K. C. Woodyard, party chief for Continental Oil Co. at Gonzales, Tex., has been transferred to Karnes City, Tex.

T. L. Regan, division production superintendent for Stanolind Oil & Gas Co. at Oklahoma City, has been transferred to Houston in the same capacity.

Robert Van Cleave, foreman for Ohio Oil Co. at Rawlins, Wyo., has been transferred to Sidney, Neb.

J. D. Morgan, engineer with Phillips Petroleum Co., has been transferred from Shidler, Okla., to Oklahoma City.

Larry O. Seaman, head of the geophysical department for Sinclair Oil Co. at Tulsa, has been transferred to Fort Worth in the same capacity. He has been with Sinclair for 24 years.

F. M. Files has been appointed superintendent of the Northwest division of Phillips Petroleum Co.'s refining department, replacing **J. W. Loy,** who has been given a temporary leave of absence by Phillips for work with the Petroleum Administration for Defense in Washington, D. C. Files joined the firm as a chemist immediately following his graduation in 1930 from Austin College, Sherman, Tex.

Douglass M. Stewart, reservoir engineer for Humble Oil & Refining Co. at Kingsville, Tex., has been transferred to Encino, Tex., as district engineer.

T. W. Sudberry, tool pusher for Noble Drilling Corp. at Big Lake, Tex., has been transferred to Monahans, Tex.

L. G. Sweatt, chief operator for El Paso Natural Gas Co. at Goldsmith, Tex., has been transferred to Oil Center, N. M., as plant superintendent in charge of the Hobbs, Monument, and Eunice plants.

William P. Harvey, party chief for Geophysical Service, Inc., at Lamesa, Tex., has been transferred to Plainview, Tex., as supervisor of seismic crews in West Texas. Later he will be transferred to Midland, Tex.

R. D. Curtis, vice president in charge of production for Murphy Corp., has been called into the Petroleum Administration for Defense setup, and has been given a year's leave of absence for that purpose. **Paul C. McDonald,** formerly engineer in charge of the operations section of the department, has been appointed assistant vice president and placed in charge of the production department to serve in Curtis' absence. **E. H. Haire,** formerly natural gas-gasoline advisor to the vice president, has succeeded McDonald in charge of operations. **L. C. Carner** has joined the company as production superintendent for the Ark-La-Tex district and is stationed in El Dorado, Ark. **W. J. Thornton** has been made a provisional district superintendent and is temporarily at Farmington, N. M. **Claude Weekly** has been transferred from Graham to Odessa, Tex., as production superintendent of the West Texas district, and **Alvin Simpson** has joined the firm as petroleum engineer for the West Texas district and is located in Odessa.

L. P. Layman, exploitation engineer for Shell Oil Co. at Franklin, La., has been transferred to New Orleans on a special assignment.

Riley A. Aucoin, supervising petroleum engineer for Humble Oil & Refining Co. at Tyler, Tex., has been transferred to New Orleans.

George Calleya, formerly technical adviser to Petrofina, a Belgian company, has been appointed general manager of Mexican American Independent Co. (CIMA), succeeding **Bart W. Gillespie** who has resigned. Calleya served as an engineer with Standard Oil Co. (N. J.) affiliate in Romania, and has had experience elsewhere abroad as well as in the United States.

Edmond Borys, formerly connected with **H. L. Hunt** and working out of the Dallas headquarters, has joined El Capitan Oil Co. at Midland, Tex., as a geologist. Previously he had been superintendent of exploration for the Midland division of Standard Oil Co. of Texas.

John M. Clevinger, field foreman of the Odessa, Tex., district, for Sinclair Oil & Gas Co., has been made district superintendent for the recently established Sinclair district production office in Crane, Tex. **Bert Jones** has been transferred to Crane from Odessa as district clerk, and **Bob Davis** will be the acting engineer with residence in Midland, Tex.

A.P.I. OFFICERS.—Newly elected officers of the Houston chapter of the American Petroleum Institute are, left to right: Sam C. Oliphant, Stanolind Oil & Gas Co., chairman; W. B. Duncan, Houston Oil Co., adviser; H. F. Hopkins, Halliburton Oil Well Cementing Co., secretary-treasurer; and Charles W. Laas, Gulf Oil Corp., first vice chairman. Also elected were: Leonard A. Swanson, Standard Oil Co. of Texas, second vice chairman; John B. Goodrich, Magnolia Petroleum Co., L. T. Tighe, The Texas Co., A. C. Golden, Pan-American Gas Co., Ralph J. Schilthuis, Humble Oil & Refining Co., C. Marks Hinton, American Republics Corp., and W. O. Bartle, Brewster-Bartle Drilling Co., advisers.

DEATHS

A. H. Anderson, 64, West Texas-New Mexico division electrical foreman for Humble Oil & Refining Co., died February 10 in Midland, Tex. He had been with Humble 29 years.

Irvin Harris, 48, driller for Big West Drilling Co., died February 11 in Midland, Tex.

Tom W. Fentem, 51, secretary-treasurer of Kerr-McGee Oil Industries, Inc., died February 9 in Oklahoma City.

Frank R. Crowell, 96, pioneer oil-tank builder, died February 11 in Tulsa.

XUM

Risk Ratios in Wildcat Drilling

Here is a plea for a more detailed breakdown in exploratory drilling statistics, to the end of making them more usable in financial risk reports and evaluations. The author presents some constructive ideas.

by V. Dale Martin

TOO few data and too little material of a serious nature have been published covering risk ratios in wildcat exploration work. This is not only true with respect to "rank" or new-field wildcats, but with respect to other categories or classes of drilling, as well.

The value of the statistics in Frederic H. Lahee's "Degrees of Success in Wildcat Drilling" is gratefully acknowledged and his warning about indiscriminate use of such statistics is applauded. However, Lahee's article does not go far enough in the differentiation of "rank" wildcats. The risk-ratio figures derived are true, but only for what they represent.

What do they represent?—They represent the results, lumped together, of all "rank" wildcats drilled in the 17-state area indicated, regardless of whether they were located by chance or the "willow wand," by poor, good, or excellent geological studies (geophysical work is included in geological studies).

In other words, as we all know, many wildcat wells are drilled by small operators on "trends" only, others are drilled merely because enough dry-hole-contribution money was available, and a drilling contractor was found who was willing to venture the drilling for expenses only (plus an interest in the well or block). Such wells, located without scientific studies beforehand, are counted in the type of totals given.

The geologist working for a large corporation often has to appear before a board of directors or other authority in defense of a proposed new exploration program, in which he has carefully worked out "risk ratios" for a particular area, to arrive at the amount of expenditure, necessary to assure success of the venture, which sum should be set aside in the regular budget. Probable returns are also worked out. The same is true for the consulting geologist or the independent geologist trying to promote a bona fide deal of his own, when he faces clients with risk capital to invest. The figures and calculations used in his report are usually necessarily long and detailed adequately to prove his points. All too often they are skimmed over and the conclusions only are noted in detail.

In the case of a large corporation or a smaller company, there is often dissension as to the conclusions drawn. In the case of private and consulting deals, the work is often given to another consultant to check. The original report may prove that a risk ratio, of successful wildcats to total drilled, of 1:5 is completely adequate for the area studied. The opponents to the plan then proceed to cite various authorities, such as the figures published, to show that the over-all risk ratio is 1:12 and not 1:5, or that if only 500,000 bbl. of ultimate recovery can conservatively be expected, then the project is of no value because 1,000,000-bbl. ultimate recovery is, on the average, near the economic limit.

Risk-Ratio Use

The writer firmly believes that if risk ratios of 1:12 are used indiscriminately and if a 1,000,000-bbl. pool has to ride with every strike, both the industry and the geological profession would suffer considerably.

The geologist and the engineer making such recommendations, as to risk ratios, investment risks, etc., should be experienced and well prepared to present such figures. But he often is faced with a board of directors, the majority of whom might have come into a position of authority from sales, refining, accounting, law, etc., with all too few exploration or production men on the board—often only one, if any.

The consultant and independent geologist are frequently confronted with would-be investors who know little about the oil business. Such business-minded men are usually accustomed to receiving a relatively immediate return for every dollar spent. The idea of risking large sums of money without an immediate payout is often difficult for such men to comprehend.

Once production is secured, however, the operation falls, in general, into the same capital-risk patterns of other industries. That is to say, specific costs can then be determined for production, transportation, refining, and sale of the product. Here the average business man is on safe ground again. But the period of taking the biggest risk or change, that of finding the oil first, before the familiar type of business structure can be supported, is all too little understood. This means that reliable risk ratios have to be presented by the geologist and the engineer to secure adequate risk capital for exploration, or worthy projects for investments will be rejected.

Further Breakdown Needed

The writer feels, with respect to "rank" wildcat risk ratios, that a

This discussion refers to Frederic H. Lahee's conclusions on "Degrees of Success in Wildcat Drilling" as reported on pages 22-23 of The Oil and Gas Journal of January 4, 1951.

The ideas presented here are not intended as a criticism of Lahee's article. They are presented to call attention to the lack of sufficient breakdown in many statistics and to give additional reason to pause to think before using published statistics on wildcat success ratios.

The discussion points out that too often inadequate statistics on risk ratios are used to attack sound conclusions reached after intensive study and how sufficient breakdown of many statistics can make them more usable in financial risk reports and evaluations.

THE AUTHOR

V. Dale Martin, consulting geologist and engineer, Wichita, has had broad experience in land and geological departments of major oil companies in Colombia, Peru, Venezuela, and the United States; as engineer in gold and copper mining operations in California and Chile; and in sales and production research for manufacturing concerns on the East Coast. Martin graduated from University of Kansas with a mining engineering-geology degree, did postgraduate work at University of California, and received a straight E.M. degree from University of Kansas in 1934. He is a registered professional engineer in Oklahoma and member of several technical societies.

further breakdown should be used, showing the number of new discoveries, as well as the dry wildcats, which were located by what might be determined "chance," "good geology," and "excellent geology."

Kansas example.—As an example, for the last year and a half, the writer has been devoting his time exclusively to the Central Kansas uplift play and its extension into western Nebraska. In that large area, the over-all figure of 754 new discoveries to 8,696 rank wildcats drilled (ratio 1:11.5) determined as the over-all figure for the United States for the 1949-50 period, is not applicable to the seven Kansas counties (6,300 sq. miles) at the head of the play mentioned, (counties of Graham, Phillips, Trego, Norton, Decatur, Cove, and Sheridan). The over-all ratio for this 6,300 sq. miles is much lower, yet it is essentially a wildcat area. The figure given for the over-all United States picture would be applicable, however, to locations made by chance and those made with poor subsurface control. As a matter of comparison, in this 6,300-sq.-mile area, wildcat risk ratio (from the start of drilling in the 1920's through to the present), is 1:15. Wildcat risk ratio for "good" geological locations in the area is about 1:5, while for "excellent" geologically located wildcats (proven closure) it can sometimes be reduced to as low as 1:3.

Standardize Definitions

Going further than the scope of Lahee's article, the writer also believes that general definition of areas with "scattered," "intermediate," and "adequate" geological control should be standardized for the various types of producing anomalies, and included in published statistics as an added yardstick for risk judgment in undeveloped areas.

Such figures would not derive from the knowledge or state of preparation of a given individual or of any one company in an area, but could be cited, by areas, in terms of density of wildcats per square mile of areal extent, in terms of area covered by geophysical work, etc. Certain publications do give crew-weeks of geophysical and core-drilling work accomplished per year per state, but all too often the breakdown is not sufficient to be of value.

Going still further afield, a lack of breakdown of statistics on producing areas is usually evident, such as: failure to break down the total of dry holes drilled into dry edge wells, dry pool wells, etc.; failure to show the average initial production of new pool wells in yearly pool or field statistics; failure to show the well-months of production making up yearly cumulative production, etc.

Risk Ratios Change

To return to risk ratios, however, we all know that as time passes more and more wildcats are drilled in a potential oil-producing area. Also, more and more geophysical, core-drilling, and interpretive work is completed. The end result is a clearer picture of the subsurface with a consequent lowering of the risk ratio in all categories of location.

Resulting Advantages

What are today's over-all figures for rank wildcat locations made by "chance," by "good" geology and by "excellent" geology, as compared to the over-all picture already presented? Publication of such statistics along with the over-all figures would: highlight the value of geological studies before making a location; lend more weight to reports on areas where the risk ratio can definitely be proven to be less than the "over-all" figure; give a better general yardstick of risk measurement for new ventures.

Thus, use of over-all wildcat ratios for the United States in a case of proposed exploration of an area where the subsurface information is meager, may be entirely too optimistic, and its use in areas where the subsurface picture is well developed may be too pessimistic.

Economic Limit Variable

With respect to the statement that we may assume that a field having a total ultimate recovery of 1 million barrels is, on the average, near the economic limit—the writer is in agreement, if the words "on the average" are underlined, and it is clearly stated that this figure covers all types of operations, including deep drilling, uneconomical operations, operations where the overhead of too-extended operations is charged against the production of a small field, etc.

250,000-bbl. pool.—As an example, in a small operation in the area mentioned above in which the writer is presently engaged in operations, he can show, using the 1:5 risk ratio, that a small discovery of three producing wells with ultimate recovery of about 250,000 bbl. of oil, from 3,500-4,200-ft. horizons, will pay out over a short 8-year producing life, recuperate the investment, paying all expenses and taxes, plus about 10 per cent return on the capital investment. This is based on an average minimum ultimate production for fair wells of 85,000 bbl. each, the drilling of four dry holes to see the producing horizon before the discovery well was drilled (at $15,000 per well), the drilling of three producing wells and putting them on the line to produce ($35,000 each) and the drilling of four more dry edge wells ($15,000 each) before further drilling was abandoned and the field left as only a three-well producer.

Here is a small project of roughly only 250,000 bbl. ultimate recovery, which, developed as a small project, will pay off at a fair rate of interest. Of course it may have been drilled originally in the hope of finding a bigger field, but the oil that was discovered prevents loss of the investment. None of the figures envisage use of tax money as investment capital. Such use would make the returns larger.

Another point to be mentioned is that in considering the 1,000,000-bbl. ultimate-recovery figure as a mark to shoot at, the use of the 1:44 risk ratio is definitely not applicable in many cases. Such cases are those where a wildcat risk ratio has already been determined in an area in which geological subsurface control is sufficient to estimate the probable size of the reservoir to be tested. This is particularly true of an area where production is principally controlled by "highs," and where the vertical closure, as well as its lateral extent can be mapped before drilling. Conditions of the reservoir in adjacent areas is also known, as to porosity, permeability, thickness, even recovery per acre-foot, or better still, the cumulative production and life expectancy is already determined for wells producing from the same horizon, in nearby districts. Under such conditions, if 1,000,000-bbl. fields (or better) are the only ones desired, then only those structures large enough to warrant such production will be drilled. However, in practice, it is noted that the smaller ones are usually also drilled, particularly if located in adjacent areas.

Conclusion

In concluding, the writer wishes to again point out that he is not criticizing Lahee's figures. He heartily agrees that Lahee's warning, about erroneous conclusions that have been sometimes drawn from exploratory drilling statistics, is certainly warranted. The sole object of this discussion is to attempt to call greater attention to the lack of sufficient breakdown in many statistics, so as to make them more usable in financial risk reports and evaluations. If it will bring about a study by bodies publishing such valuable statistics, as to how to make their statistics more presentable and of greater value, then the effort will not be wasted, and the result will be of great value to the industry, as well as to the people behind the investments in that industry.

Conference to Tulsa

The sixth Petroleum Mechanical Engineering Conference, sponsored by the American Society of Mechanical Engineers, will be held at the Mayo Hotel in Tulsa September 24-26.

Committees are already developing various technical sessions which will embrace all phases of the industry. Last year the conference was held in New Orleans, during which approximately 390 engineers attended.

XUM

OIL-COMPANY ENGINEERS ANALYZE

Drilling—

by W. S. Crake*

More automatic drilling controls, hydraulic torque-converter drive for small rigs, improved jet bits, and mud-pit-level indicators featured 1950 drilling developments in the United States.

W. S. CRAKE

WIDESPREAD adoption of automatic drilling controls, acceptance of hydraulic torque-converter drive for small drilling rigs and servicing rigs, developmental work on jet bits and mud-pit-level indicators, featured engineering developments in the field of drilling in the United States during 1950.

*Chief mechanical engineer, Shell Oil Co., Houston area. Paper presented at annual meeting of Houston A.P.I. Production Chapter, January 23, 1951.

Box-type A-frame mast.

Surface Equipment

Torque converter slush pump.— There has been some hesitancy in the acceptance of the converter drive for rig slush pumps. This has been due to the unwillingness of pump manufacturers to impose the high-torque multiplication on pump-power ends for fear of materially reducing the life, or causing premature failure of piston rods, bearings, and gears. However, in spite of this, a number of progressive thinking operators are proceeding with their own designs of torque-converter-driven pumps. A number of reputable manufacturers are offering rigs with the pump V-belt drive taking off from a converter-driven compound.

Theoretically, it can be shown that with the proper liner size in a pump, there is greater average fluid horsepower delivered by a pump for the same input horsepower using a mechanical drive than when using a torque-converter drive. This, of course, is due to the greater efficiency losses in the converter. In the field, the problem is: Will liners be changed before their pressure rating is exceeded, causing the engine to lug down and deliver less than rated horsepower? When liners are changed, will the proper size replacement liner always be selected?

Experience has not shown this to be true. It is believed, therefore, considering average slush-pump field operating procedure, that the torque-converter pump with its requirement of fewer liner changes would actually have an average hydraulic horsepower delivery better than the mechanically driven pump.

During 1950, Shell Oil Co. has placed in operation a 14-in. duplex pump with a torque-converter drive. More than 85,000 ft. of hole has been drilled in 1,800 hours of operation using this pump on wells to a depth of 6,400 ft., with a single-sized 7¼-in. liner.

For the particular engine chosen for

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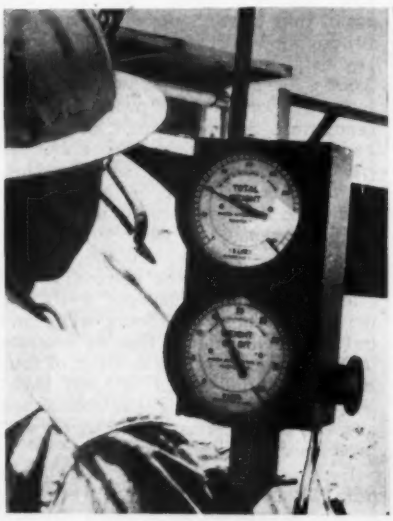
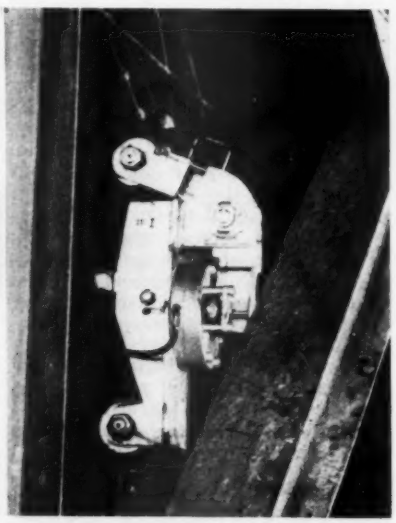


New weight indicators.



Weight-indicator mechanism.

NEW METHODS AND EQUIPMENT IN *Production*

by H. E. Treichler, Jr.*

H. E. TREICHLER, JR.

Gravel packing, gas lifting, and formation-stimulation improvements featured 1950 completion methods; tank batteries, tubing joints, low-temperature separation highlighted equipment-design changes

IMPROVEMENTS in gravel packing, gas lifting, and formation stimulation featured completion methods employed in the United States during 1950. In the field of production equipment, design changes were made in low-temperature separation, tank batteries, and in tubing joints.

Completion Method

Gravel packing. — Improved technique in gravel packing of wells was not a new development but many innovations were made during the year in adaptation of gravel packing to completion problems. The new developments differ from the old in three respects. The most important factor is the size of the gravel used. Gravel used on the Gulf Coast ranges in size from .020 to .060 in. in diameter. A second and an important development is the discovery that gravel can be squeezed through perforations in casing, thereby making the gravel pack in perforated casing just as feasible as in an open-hole completion. The third improvement is the realization of the necessity of using clean fluids for placement of the gravel.

Several new tools have been developed to gravel pack wells. The main object is to conserve time. A brief description of a gravel-packing job will give the best example of the technique. Open-ended tubing was run to the bottom of the hole. The well was circulated with clear salt water or oil, depending on conditions. Fine gravel was then pumped to the bottom of the hole, 1 cu. ft. at a time, and squeezed through the perforations until it was found by checking the bottom with the tubing that additional gravel cannot be displaced from the hole. A predetermined amount of gravel was then spotted in the bottom of the hole and the tubing was pulled. A small-sized slotted liner or screen, 2⅜ or 2⅞-in. in diameter, was then run in the hole and washed through the gravel to bottom. The liner packer was set and the well completed.

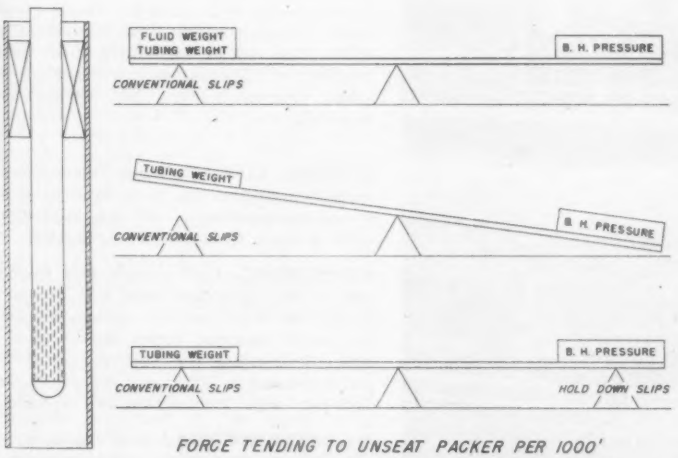
This technique of completion has made it possible to put wells on production that, until the advent of this procedure, had been impossible to produce.

A recent application of gravel packing was announced by Thomas S. West who cited cases in which he has gravel packed a small liner in open hole with alternate layers of coarse and relatively impermeable material. By using this technique, setting a packer inside the liner and pumping oil into the upper part of the formation and producing from the lower portion, he was able to produce very thin oil columns with no free gas.

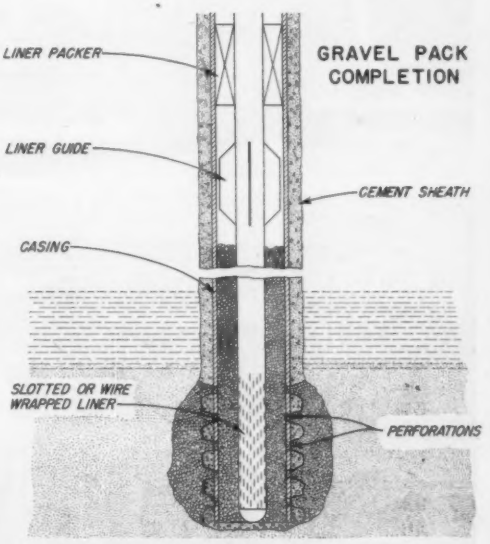
Gas lifting.—The number of wells being gas lifted was increased again in 1950. Some minor improvements were made in the equipment itself, but it is probable that the major improvement in gas-lift efficiency results from closer attention to performance of the individual well. This

(Continued on page 79)

*Superintendent, Houston Oil Co. of Texas. Paper presented before the Houston A.P.I. annual meeting, January 23, 1951.



Schematic analysis of packer forces.



Improved gravel-pack completion.

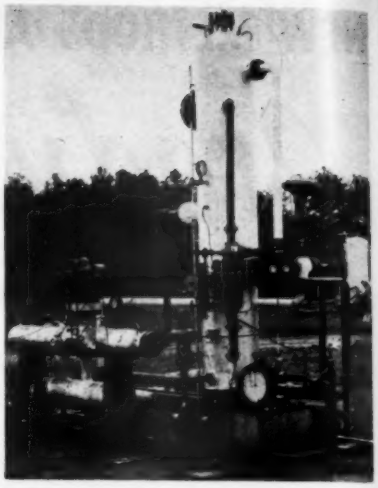
PRODUCTION EQUIPMENT

Low-Temperature Separation

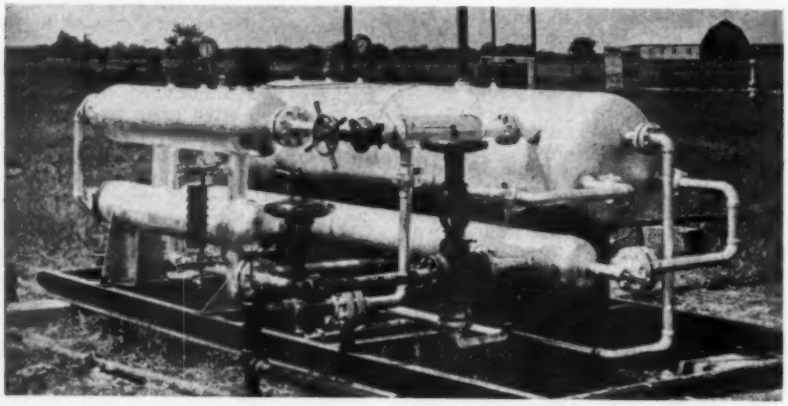
EXTENSIVE tests have shown that extraction of distillate at temperatures well below the hydrate formation temperature results in a substantial increase in hydrocarbon recovery compared to even the best methods of stage separation where the initial separator is operated slightly above the hydrate point to permit continuous operation without freezing troubles. Experience has shown that this increase, depending on the hydrocarbon content of the gas, results in a gain of from 5 to 15 bbl. of distillate per million cubic feet of gas produced.

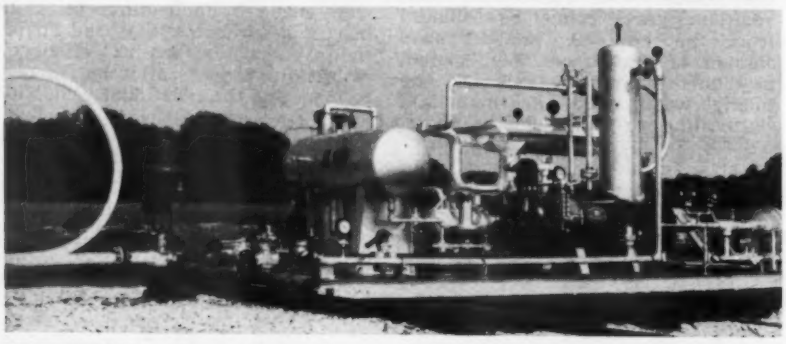
EDITOR'S NOTE: The process for extraction of hydrocarbons from high-pressure distillate gas at low temperatures is not new. Created on the design engineer's drafting board 14 years ago, low-temperature extraction resulted in the first cycling plant for high-pressure gas wells. Today's gas market and gas-transportation system removes more than 1,000,000,000 cu. ft. of gas per day from these high-pressure gas-distillate wells served by modern separation equipment.

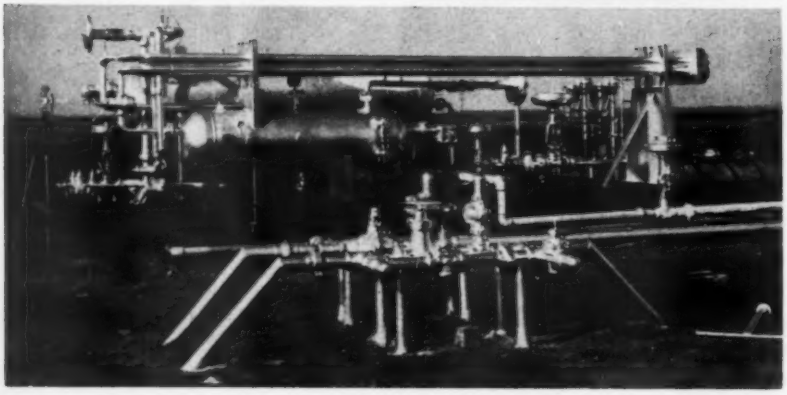
However, the recent development of field separators to improve extraction is of important interest, as mentioned by the author in the accompanying article. Here are additional discussion and photographs of four recent installations of this equipment.



BLACK-SIVALLS & BRYSON.—(Above) This low-temperature separation unit, 20-in. by 9 ft., 1,000 psi. w.p., installed at a Gulf Coast field, has a daily capacity of 5,000 M.c.f. per day.







Low-temperature extraction not only produces increased revenue from additional recovery, but also reduces the water content of the high-pressure salable gas to a point where it can be moved through gathering lines, without hydrate formation trouble or water accumulation. Dehydrated gas also reduces to a large extent corrosion trouble encountered in gas lines, which is a highly important factor in the distribution of gas. Water dew points of the gas leaving the low-temperature separator have been found to run on an average of 5° to 10° F. below the indicated temperature at which separation is made.

Most of the initial development work on low-temperature extraction was done many years ago on large centrally located plants. However, the increased demand for natural gas has brought about a need for small compact skid-mounted low-temperature extraction units for individual well equipment. This need has resulted in some unique designs for continuous operation.

NATIONAL TANK.—(Left, top) This low-temperature extraction unit, 30 in. by 10 ft., with a working pressure of 1,000 psi., is in operation in South Roanoke field, Louisiana.

PARKERSBURG.—(Left, center) This Hyreco unit, a Gulf Coast installation with a capacity of 5,000 M.c.f. per day, features a 3,000-psi. water knockout vessel shown on the skid. Well effluent at 110° F. and 2,700 psi. is reduced to 31° F. and 500 psi. in the 1,000-psi. w.p. low-temperature separator.

MALONEY-CRAWFORD.—(Left, bottom) In operation in East Dover field, Kingfisher County, Oklahoma, this low-temperature separation unit, with a capacity of 10,000 M.c.f. per day, was installed for Superior Oil Co. at E. G. Long 88-16.

Engineers Analyze Production Equipment

(Continued from page 77)

has been caused by the increased cost of gas at the well head.

Several refinements in valves and controls having been made. A means of changing valves by use of a wire line, eliminating the necessity of pulling the tubing, is being worked on at this writing. It has been reported that several strings have been in operation for some time. One of the gas-lift service companies will soon be ready to offer these valves to the industry. If this procedure proves satisfactory, the cost of gas lifting should be reduced.

Another device in the line of gas-lift equipment that was in the developmental stage during 1950 is an adaptation of the old plunger lift. A plunger, or mandrel, has been designed that will travel up the tubing between the fluid and the lifting column of gas. This plunger is calculated to minimize the bypassing of gas through the fluid on deep intermitter-type installations. This device has shown some promise on test runs in certain types of wells, but results are not conclusive.

Strata-Lift. — Attention was continued towards increasing the productivity of low-permeability reservoirs.

The back-log of experience in the application of the Hydrafrac process has resulted in increased selectivity of wells used for treatment and the percentage of successful jobs has increased.

Success also has been reported on the use of the Strata-Lift. The latter technique employs a high-viscosity acid as the fracturing fluid. This acid returns to a fluid state after a predetermined period of time. In a calcareous formation, the acid reacts with the soluble part of the formation after it returns to its fluid state and enlarges the passage made by application of pressure. This same type of acid, in a less viscous state, is being successfully used in the same manner as regular acid in lime formation. The advantage lies in the fact that the action of the acid is retarded and the acid is spent away from the well bore rather than at the wall of the hole. Research is being carried out to increase the limiting temperature at which bore-hole work may be conducted.

Physical Equipment

Production packers.—The year saw broader adoption of the hold-down type of production packer. Some improved packers have been developed. The hold-down-type packer finds broadest applications on gas-lift installations, on dual completions, and in any other installation where the forces working on the packer are variable.

For example, in a hypothetical gas-lift installation, when the packer is first set, an overbalance of forces tends to push the packer to bottom. This tendency is opposed by the action of conventional slips. When this well is placed on production, the bottom-hole pressure changes so that the working fluid level is 1,000 ft. below the static fluid level. If, for some reason the gas supply should fail and the pressure released on the casing, the bottom-hole pressure would tend to build up to static conditions and a force in excess of 7,000 lb. would be exerted upward and tend to unseat the packer. This action is often seen when sand is found above the production packer in the annulus; sand is most likely to find its way into this position by passing upward around the packing element.

Tubing joints.—Pipe manufacturers during 1950 carried on a large amount of development work to eliminate trouble from leaky tubing connections.

The most recent development is an integral joint tubing of the box-and-pin type using standard A.P.I. tubing threads for strength, and a metal-to-metal seal to retain pressure. The outside circumference of the bottom part of the pin seals against the inside circumference of the bottom part of the box.

Well-head equipment.—No major developments were made during the year on christmas-tree design. The major improvements along this line were in streamlining the connections to reduce cost and to improve material to increase strength and resistance to corrosion.

A new tubing head has been developed and put into use which allows rotation of the tubing after the well is completed.

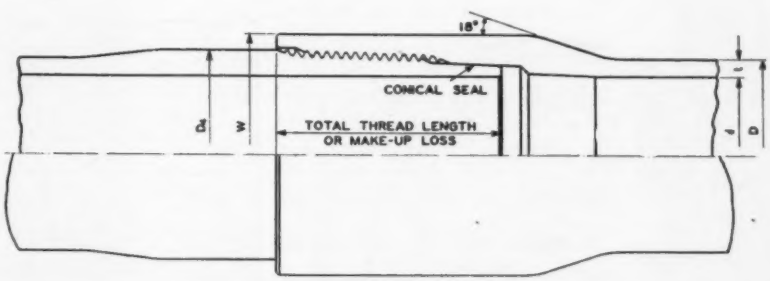
Long-stroke-type units. — In the pumping field, the major developments were in the large long-stroke-type units. This type of unit may prove to be the best answer to deep-pumping problems. The units are hydraulically or pneumatically actuated and are designed to operate the pump plunger through a long stroke at slow speed in an attempt to reduce rod stress to a minimum.

Separation equipment.—Continued development and improvement of low-temperature separation was a major step during the year.

Equipment manufacturers and operators cooperated in the determination of the optimum size, kind of equipment, and the proper application. When installed under proper conditions, a low-temperature separation system brings about increased liquid recovery, lessens the tendency to form hydrates, and results in a shorter payout period. Under ideal conditions, their application reduces the water content of the gas to interstate pipeline requirements. During 1950, a number of these units were installed and most of them are believed to be fulfilling expectations.

Tank-battery design.—Progress in tank-battery design for both land and water operation has been noted during the year. Shell Oil Co. has in operation a completely automatic lease in East Texas field.

In Louisiana, The Texas Co. is using barge-mounted tank batteries for marsh locations. These batteries are conventional in most respects except that they are mounted on a large barge, the hull of which is also used for storage. The barge rests on bottom when full. Both Gulf Oil Corp. and Atlantic Refining Co. are using a specially designed submersible barge equipped with a superstructure on which the tank battery is located. These units are being used in semi-open water.



SPANGSEAL INTEGRAL JOINT TUBING

(A.P.I.-8 round threads per inch — ¾-in. taper per foot on diameter)

Size o.d.		Tubing dimensions — Inches					
(D)	Weight	Wall	Nominal i.d.	Drift	Pin o.d.		Box o.d.
(in.)	(lb./ft.)	(t)	(d)	diameter	(D_p)	Makeup loss	(W)
2.375	4.70	.190	1.995	1.901	2.594	2.911	3.000
2.875	6.50	.217	2.441	2.347	3.094	3.098	3.531

Improved box-and-pin-type tubing joint.

XUM

Engineers Analyze Drilling Equipment

(Continued from page 76)

this design, it was found that the manufacturer's rating was 260 hp. at 1,600 r.p.m. However, with the torque converter in the power train, the manufacturer stands behind higher-speed operation, 1,800 r.p.m., with larger fuel injectors. At this speed the engine rating is 350 hp.

It was found necessary to provide safety controls on the pump to prevent imposition of greater than the desired torques on the power end. Instrumentation to accomplish this purpose consisted of standard available air and hydraulic controls. This unit was designed to allow maximum input torque to the pump of twice the pump manufacturer's rating. It was believed that overloads of this magnitude were not dangerous due to the shock-absorption characteristics of the converter and the reduced flywheel effect of the sprockets used in the chain drive for this unit as compared to the larger V-belt pulley.

Pressure and speed curves recorded for the torque-converter-driven unit and for a mechanically driven pump of the same size, while circulating at the same depth, show the improved load conditions placed on the converter pump. The imposition of higher-pressure peaks and wider cyclic variation from high to low pressure, as recognized respectively in greater impact loads and wider variation in applied forces in fatigue loading are apparent for the mechanically driven pump.

Hydraulic torque converters. — Acceptance of the hydraulic torque-converter drive by operators and drilling-equipment manufacturers for use in the power train of servicing rigs and the smaller drilling rigs has been rather general. High-starting torques for rapid acceleration of pipe string from standing starts; the availability of 80 per cent or more of input horsepower during the majority of the hoisting cycle without engine lugging; the use of high-speed, compact, lightweight engines facilitating rig moving and building, and the requirement of fewer mechanical speed ratios when using a properly geared converter rig have made this application of torque converters particularly advantageous.

Torque-converter rigs of the greater depth capacities did not prove popular until recently. From the number of rigs currently in use, and those sold during 1950, in the 700 to 1,100-hp. class, this acceptance is now apparent. One prominent rig manufacturer has sold nine two-speed rigs in this horsepower group during the last 2 years. Also, it is reported that one 1,700-hp. torque-converter rig is already in service. Another converter rig of the same capacity is under construction for a major company on the Pacific Coast.

Slush-pump pulsation dampeners.— These devices, on which experimental work has been done over several years, are finding increasingly wide use on slush pumps—particularly power pumps.

Several manufacturers offer field devices, but a considerable amount of trouble has been experienced in making the rubber envelopes retain gas charges and in preventing these charges from leaking. The dampener can increase valve, piston, and liner life; reduce maintenance on mud hoses, and reduce vibration and fatigue in the derrick, wire lines, drill pipe, and so forth. In drilling, using light weight on bits, or in fishing, their use can improve operation and the life of bottom-hole tools considerably.

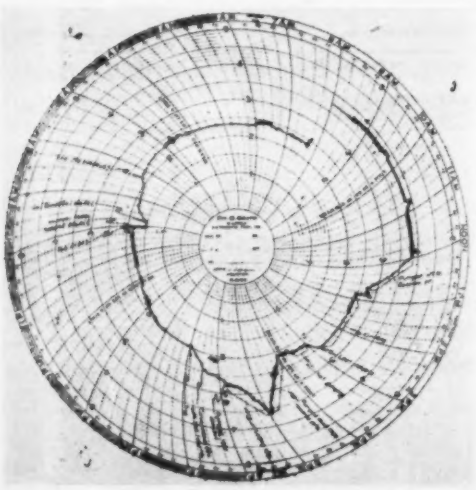
In conjunction with supercharging of slush pumps, hydraulic or electric drives, application of slush-pump pulsation dampeners can enable higher mean loads to be carried by a given pump. Since this higher load may be from 50 to 100 per cent, the cost of the dampener, converters and drives is rapidly paid out in reduction of purchased slush pump horsepower, transportation, and the like.

Automatic drilling controls.—During 1950, a greater number of automatic drilling controls have been placed in operation, as far as the author has been able to determine, than in all previous years combined. There are now about 50 in operation and their acceptance as a major means of increasing bit life appears certain. They have also resulted in reduction in round trips and rig wear and tear, and greater penetration rates. Life increases of 15 to 50 per cent have been recorded on ordinary bits and from 50 to 200 per cent on diamond bits.

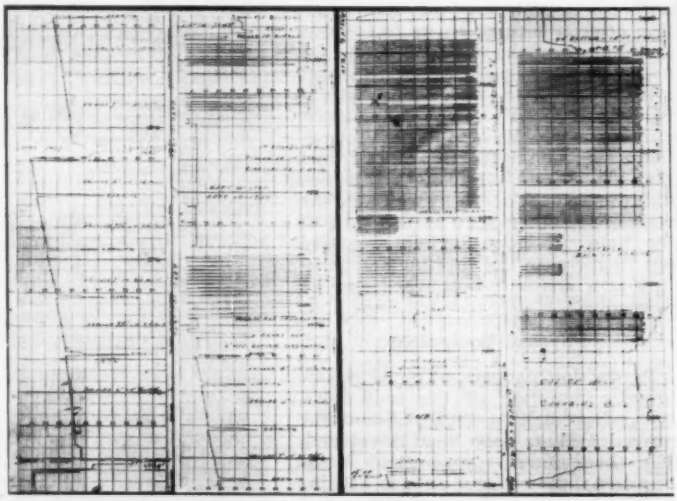
Five makes of controls are now offered for sale, costing from $7,500 to $15,000 and of varying degrees of development and desirability. One control, the simplest type, is in great preponderance in proven use, totaling about 80 per cent. Operators should be careful in selection of controls to insure they purchase a practical device which is not still "experimental" to a major degree, unless they wish to help experiment toward better controls.

Full-view drilling mast.—A revival of the latticed box-type A-frame mast, which was used on an all-electric rig belonging to a major company on the West Coast several years ago, was seen in the new 133-ft. mast marketed this year. This mast, with no girts or braces to obstruct the driller's view of the traveling block and derrick man, offers high visibility. This construction also offers considerable free floor space for equipment installation and safe working conditions.

The mast has a novel raising mechanism. One end of each raising leg

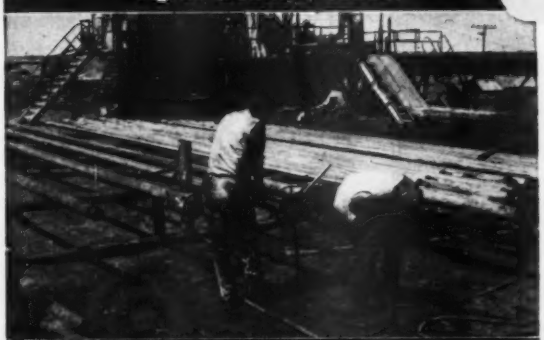


Mud-pit-level chart.



Drilling-time chart.

Standard-Fryer Drilling Company's rig at Quanah, Texas.



Tool joints being removed from old drill pipe.

Tool joints being installed on new pipe — at the rig.

REED Super Shrink-Grip TOOL JOINTS

Standard-Fryer Drilling Company of Dallas, Texas, reports . . .

We saved a lot because this drill string had REED Super Shrink-Grip Tool Joints!

"We had an 8,000-foot string of drill pipe go bad at Quanah, Texas and were really lucky the tool joints were **REED** Supers.

"In no time at all, we removed the tool joints from the old pipe and installed them on new pipe *at the rig.*

"We saved a long haul to and from a machine shop – and plenty of down time on the rig. In addition, **REED** Super Shrink-Grip Tool Joints never give us any trouble."

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is pinned to the substructure at ground level and the other end is fitted with rollers that ride in tracks on the inside of the mast legs. The mast is raised by the pull exerted on the legs by lines which are yoked to the hook. As the traveling block is raised, the lines pull the legs inward and the rollers move downward along the track, tilting the mast upward.

Boilers.—The field test of the three 300-hp. coil-type, water-tube boilers conducted in Louisiana and described in last year's drilling review of this chapter, has been concluded. The boilers have remained in regular operation. The rig with which they are used is currently drilling below 10,000 ft. in a third well.

Test results, using natural gas as a fuel, showed that one boiler can produce 15,000 lb. of steam hourly at 500 psi. w.p. and 20° F. superheat, or as much as 29,000 lb. hourly of dry, but not superheated steam at 500 psi. Average thermal efficiency of 80 per cent was obtained compared with about 65 per cent for heavily lagged regular fire-tube boilers.

A test using Bunker C fuel oil was attempted but was discontinued due to coking up of the burners. The manufacturers have a new design of oil burner which has shown good promise in factory tests but has not been field tested. Development of a suitable oil burner will go far toward making the boiler available for general use.

Mud-pit-level indicators. — An instrument for indicating and recording variations in level in the rig mud tanks has advantages as an aid to the driller as an immediate indicator of the following:

1. High-pressure gas, oil, or salt water flows recognized by increases in mud level.

2. The presence of lost circulation zones recognized by decrease in mud level.

3. The swabbing effect, or change in effective hydrostatic head on the formation occurring during withdrawal of drill pipe from the hole, recognized by increase in mud level.

Early detection of these conditions is important. By taking rapid remedial action, the expense of combating these problems is considerably lessened, as is the danger of losing the well and the hazard to personnel and surface equipment.

At least two companies are now offering pit-level instruments which have proven reliable in service. In actual operations, these instruments are credited with appreciable saving of mud costs and reducing rig time.

Charts, with the sequence of events recorded, will show an indication of (1) lost circulation, and (2) salt water flow.

In addition to the recording chart, each of these instruments is also equipped with an audible and visual alarm system, adjustable from the driller's position, which warns him of any predetermined variation in mud level.

Drilling-time recorder.—This instrument is a useful safety device. It provides an adjustable automatic mechanical signal to indicate when the engine throttle should be shut off. Another signal indicates close approach of the blocks to the crown.

It also embodies a recorder which gives a full record of both round trips and drilling operations which can be used for logging or time-penetration purposes. By employing a two-speed or a high-speed clock to give suitable spreading of the round trip, detailed engineering time studies of round trips can be made which are invaluable for research and rig-design purposes.

Air-operated weight indicator.—An air-operated weight indicator and weight-on-bit indicator, using a null balance air system on the dead line, has been introduced. The emanating signal is not subject to temperature variations and can be used for operation of automatic drilling controls. A system of this type was used by the author 3 years ago in an effort to overcome the deficiencies of temperature effects on weight indicators then in effect when operating automatic drilling controls.

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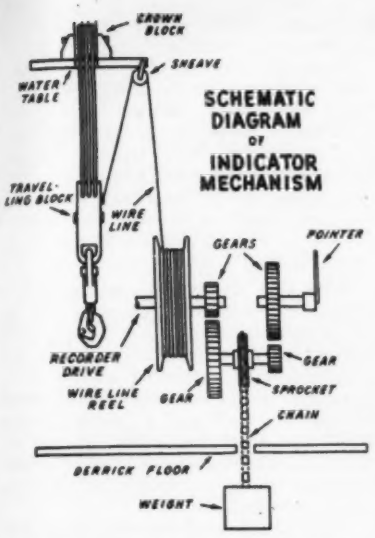

Weight-indicator schematic diagram.

Eddy current clutches.—One rig in Mississippi was equipped in 1950 with eddy current clutches. These operate on the same basic principle as the dynamatic brake except that both the coil holding and plain rings rotate as in the fluid coupling. Advantages claimed over conventional friction clutch plus fluid coupling are instantaneous torque control, wide-range constant torque characteristics, and the like.

Excitation is set so that no torque is transmitted by this clutch at idling speed. An idler brake or other transmission-stopping device is needed to "kill" the transmission shafts.

Console controls. — An increasing trend has been noticed in concentration of all hoist, and often pump, controls in a single panel or cabinet. Generally, the cabinet is mounted on the draw works at the driller's position.

The long need of the industry for a reliable remote-operated brake of suitable control quality has been met by at least two manufacturers. When this is generally available, the operator will be able to separate the hoist from the driller and place the latter where safety and visibility best require. It will also save considerable sums of money in rigging up and substructure.

Remote-operated brakes must be of the "fail safe" type which are full "on" in the event of operating power failure. These should be of a type in which motion of the brake handle produces a similar positive motion on the brake mechanism. Relatively long brake handles are needed to give enough control over close settings to the driller. A synthetic "feel" of resistance to the operating lever is also required to maintain the illusion now obtained on ordinary brakes. Action on the latter device, since it is tied to complex multiplying levers on ordinary brakes, is not proportional to brake power and the remote brake merely needs springs against which the driller presses to give a similar "feel" of pushing against the brake load.

Automatic derrick equipment.—As an outcome of the work done by a major company on its "automatic drilling rig," a supplier has now developed power equipment for facilitating and accelerating the work of the derrick man. This equipment has been in use for some time and is apparently quite successful.

Power-operated stabbing boards have been proven practical and economical on deep casing jobs. These allow the stabber to position himself by a power device so that he is always in the right place for stabbing pipe and applying elevators.

Safety color code.—The work of the American Association of Oilwell Drilling Contractors and oil companies has resulted in the adoption of a safety color code for use on drilling rigs.

Subsurface Equipment

Hydraulic pulling tools.—Use of the hydraulic pulling tool has gained widespread acceptance as a means of recovering liners, production packers, sanded-up tubing, and other fish. As an illustration of the interest which has been shown in the relatively new

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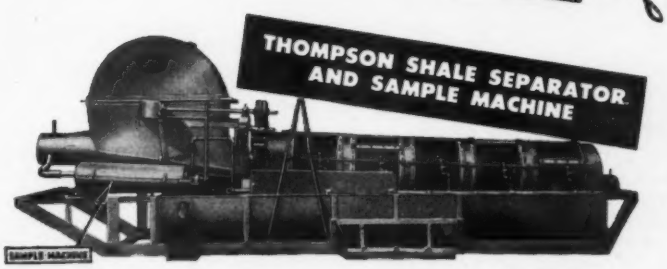

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tool, one Texas Gulf Coast workover contractor reported that he has performed in excess of 100 hydraulic pulling jobs for various operators.

There are now at least four service companies offering their designs of this tool, three of which entered this specialized field during 1950. The tools available can be run in casing sizes from 5 to 9⅝ in. and have multiplication factors of from 30 to 1 to 90 to 1. This multiplication factor refers to the ratio of the pull exerted on the fish in pounds to the applied pump pressure in psi. Thus, a tool with a 90-to-1 ratio would exert a pull on the fish of 270,000 lb. with a pump pressure of 3,000 psi.

It is evident, then, that the hydraulic pulling tool may effect a lifting or jacking force upon a fish many times greater than is possible or practicable with a hoist and fishing string in the conventional manner. Also, when using such a tool, only a light well-servicing hoist and mast of sufficient size and capacity to handle the weight of the fishing string is required. Records indicate that liner-pulling jobs, where no unusual difficulty has been experienced, have cost as little as $1,000. This figure includes the cost of fishing-tool attachments, freight, service operator's time and expenses, as well as rig time.

Perforating guns.—The use of jet perforating guns has increased greatly in the past year due, in part, to improvements made in both the guns and charges. The problem of leaving debris in the hole has been attacked vigorously with notable success. One company has eliminated the port seals in the charge carrier (the source of most debris) by providing a charge totally enclosed in a glass case which is reduced to fine sand when the charge is fired. Another company has concentrated on the development of an improved seal, most of which stays in the carrier, thereby practically eliminating debris.

Considerable discussion has taken place concerning the advantages or disadvantages of the types of charge carriers used, that is, hollow, solid, and strip types. Experimental comparative shooting has indicated that the solid and strip-type guns show more tendency, than does the hollow type, to swell or bulge casing unsupported by cement, and to produce irregularly shaped split holes. Comparative effects on casing solidly encased in cement have not been determined, as far as we know, but it would seem logical to assume that the solid and strip types would produce greater shattering of the cement sheath than would the hollow type.

Percussion drilling.—During the past year a considerable amount of development work has been performed on the mud-engine type of percussion drill and approximately 10,000 ft. of hole was drilled. The general trend has been to decrease the weight of the reciprocating hammer and also to increase the oscillating frequency of the hammer. Tests of such design changes have produced encouraging results when drilling Permian limestone and dolomite. Percussion drilling in hard friable formations, such as chert and granite, has continued to show considerable advantages over conventional drilling.

Actual test results have shown the penetration rate increase in chert to be as great as 100 per cent and the life of the bit was prolonged as much as 200 per cent. The hole-straightening ability of percussion tools which employ small bit preloads has yet to be established. However, one tool which does not employ preloading is being tested and the use of this tool as a hole straightener appears encouraging.

The design of bits for use on percussion drills has also progressed within the past year. The most preferred bit at this time is one of the two or three-cone design which is constructed with journal bearings. Gage edge wear when drilling in chert still presents a problem and, as yet, attempts to alter the design of previously tested bits have produced little or no result.

Subsurface Practices

Jet bits.—A considerable amount of additional work was done in 1950 on the development of "jet bits," mainly on rock bits. It is believed that this development is still in its early stages. A number of suppliers and companies are attempting to evaluate the proper use of these bits. Increases of over 100 per cent in penetration rates have been recorded in certain specific cases and longer footage life to bits has been achieved. The chief problem at this time is the limited space geometrically available in bits for accommodating the jet tubes.

Fundamentally, the function of the jet in hard drilling is to remove cuttings from under the bit teeth and thus avoid recutting which destroys effective bit life and reduces the efficiency of the true bit tooth action.

During 1950, 2,570 ft. of 9⅞-in. hole was drilled during a single 8-hour tour by use of jet fishtail bits. This was done by a major company rig and set a new penetration record.

Drill-collar standards and operation.—The A.P.I. Drilling Equipment Committee, working closely with contractors, companies, and manufacturers, proposed a list of standard stock drill-collar sizes and bores to simplify stock and manufacturing problems and thereby reduce the costs. Work is under way on standardization of drill-collar joints based on the practices and results of the enormous amount of work done in West Texas in the past few years.

It is hoped that the joints will be chosen for their suitability for the drill-collar job rather than because A.P.I. has a tool joint which is approximately the same size.

The past year has seen a steady improvement in field operating practices which has resulted in reduced drill-collar troubles where properly applied. Welded drill collars, consisting of hollow forgings joined by welding, have been increasingly used and without field trouble. Full-length, hollow-forged collars are available in sizes up to 6¼ in.

Wire-line drill-stem testing tool.—A major cementing company has in the experimental stage a testing tool which will run in a core barrel and which can be retrieved with a wire line. A rathole is made with a small bit on the tool and a packer above the bit is then seated in the rathole. A small sample—1½ to 2 gal.—is obtained from the formation, and a pressure recording made.

Most of the experimental work has been done in the Corpus Christi area, the tester having been run 10 or 12 times, successful runs being attained about 80 per cent of the time. In two instances, where the tester indicated dry formations, results were corroborated by drill-stem tests.

Cementing practices.—The cementing of casing has continued to receive careful study. In addition to further investigation of the mechanical phases, considerable attention has been given to use of additives in cement slurries.

A steady increase has been noted in the use of scratchers and centralizers. At present, nearly all major operators use this technique as standard practice on production strings, and often utilize it on intermediate strings and surface casing. The advantages of this method have been recognized by the independent and smaller operators, too, and they are adopting it in increasing numbers. The results attained—fewer primary cementing failures and fewer squeeze jobs during recompletions in shallower formations—leave little doubt as to the value of the technique. No complete record is kept of the number of wells in which scratchers and centralizers are used, but one large manufacturer of these items estimated that, in 1950, more than 2,000 wells were so equipped in the territory covered by the A.P.I. southwestern district. He also advised that the average number of scratchers per well is 50, the average number of centralizers is 8, and the average footage covered is 600.

Scratcher design did not change radically during the year. However, the hinged type became generally available making for somewhat greater ease of application and eliminating the necessity of welding split scratchers shut after application.

The practice of adding gel to cement gained in popularity. Not only was more cement containing gel used, but the percentage of gel in the slur-

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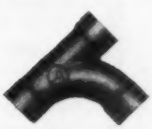

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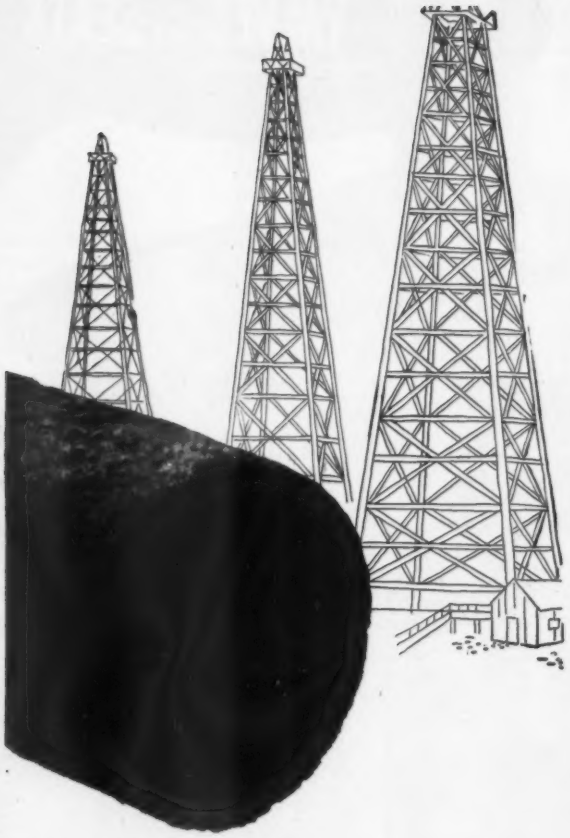

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ry was increased. For the most part, this required an increase of gel percentage from 2 to 4 per cent to 4 to 6 per cent, but some special work was carried on which indicates that, under certain conditions, a 14 per cent gel mixture is advantageous. This 14 per cent mixture presently is attained only with common cement in which a special dispersing agent is used. Results of using the available commercial slow-set cements were too erratic for practical application. Some of the reasons cited for the use of the 14 per cent mixture are: (1) ease of perforation of the cement sheath; (2) it is the highest percentage which can be used and still obtain sufficiently high compressive strength; and (3) it offers maximum fillup for money spent.

The last year has seen an increase in the use of processed perlite, both as a lost-circulation material, and as an aggregate in cement slurries. In the latter case, the material acts not only to prevent lost circulation but also to lighten the weight of the cement column. Slurry weights in about 11 lb. per gallon may be obtained. The material also has been used as a plugging agent in squeeze-cement operations. While the product is distributed to some extent throughout the Gulf Coast region, its widest application was made in West Texas.

Drilling fluids.—The outstanding feature in this field in 1950 was the completion by the A.P.I. National Subcommittee on Drilling Fluids of the Third Edition of the code for field tests of drilling fluids.[1] It will be recalled that the Second Edition was issued in July 1942. An extremely useful appendix covering the laboratory evaluation of drilling-mud materials is included with the new code.

Work with lime-treated muds continued throughout the year. Generally, lime-treated muds are being used all over the world wherever weighted muds are required. Further, their use, where anhydrite is to be drilled or for certain types of salt drilling, increased through the year in the United States and Canada. The knowledge and control of these muds has been greatly advanced by three papers published during the year by Goins,[2] Battle and Chaney[3] and Nelson and Watkins.[4]

The use of oil-emulsion muds greatly increased during 1950. The technology of these muds has been advanced by two papers published late in the year by Weichert and Van Dyke[5] and Van Dyke.[6] At the end of the year it was apparent that these muds, in addition to giving lowered torque and pipe drag, under some conditions, were resulting in longer bit life, faster drilling rates, and lowered circulating pressures. These advantages seem to develop from differences in "shale wetting" between the oil-emulsion mud and ordinary mud. Thus the lowered torque and circulating pressure can be attributed to a cleaner hole and drill stem because the formations do not "ball up."

Diamond drilling.—A continued expansion of the use of diamond coring took place during 1950. Of particular interest and as an illustration of the possibilities of this tool is the well being drilled in Mississippi by George Vasen. This well was last drilling below 19,800 ft. It had been continuously cored from 14,450 ft. with diamond bits in a 5¾-in. hole. An oil-base mud has been used since 14,670 ft. and an average of over 1,000 ft. per bit has been obtained.

More than 5,000 ft. of 5¾-in. by 3-in. core has been cut using 2⅞-in. drill pipe and a typical 10,000-ft. drilling rig.

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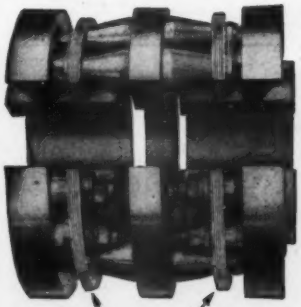

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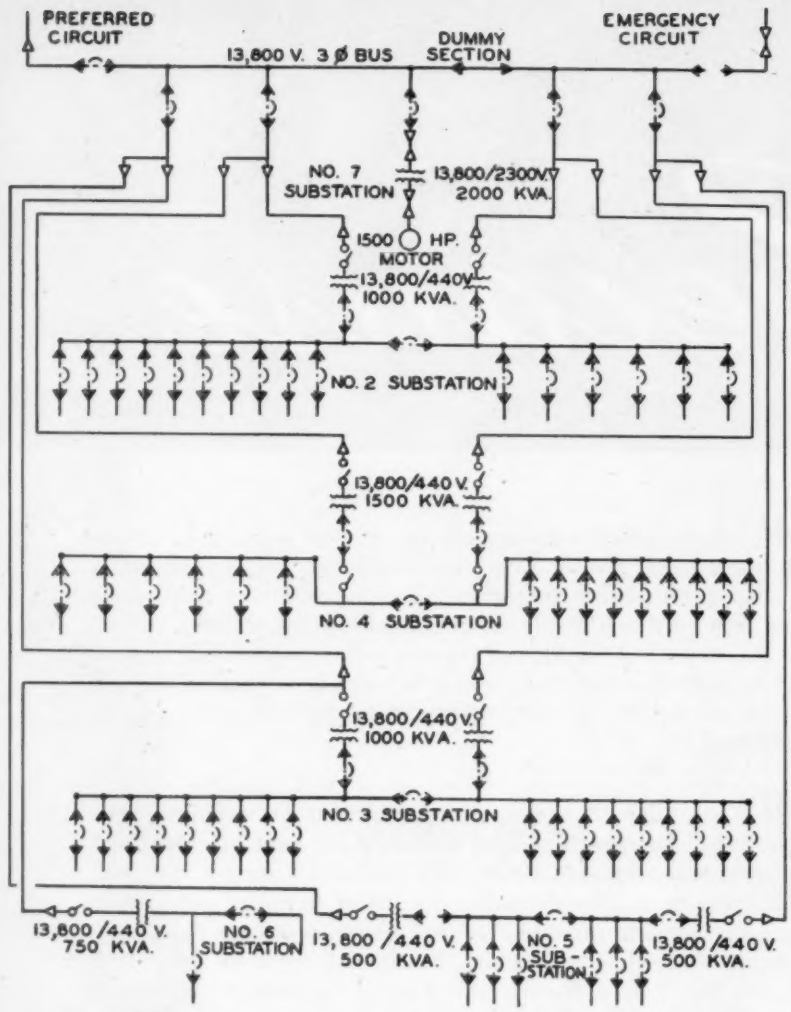


Fig. 1—One-line diagram of the electrical distribution system of Socony-Vacuum's East St. Louis refinery.

Utilization of Purchased Electric Power

in an oil refinery

by A. J. Claes*

"Purchased power, when examined from the standpoint of quality, convenience, adaptability, dependability, and economy, has satisfied the power requirements for the St. Louis refinery (of Socony-Vacuum Oil Co., Inc.). By the same reasoning the refinery is a desirable load from the utility's viewpoint."

ELECTRIC power is called upon to perform a variety of tasks in the operation of a modern oil refinery. Electricity drives the pumps; it lights the plant and the equipment in it; and it powers the delicate instruments that measure and control the oil through the various steps in the process of converting crude oil to finished product. Socony-Vacuum Oil Co., Inc., at its East St. Louis, Ill., refinery, purchases all of the electric power it uses. It is the purpose of this discussion to show how purchased power is used in this refinery.

The refinery is rated at 30,000 bbl. of crude-oil throughput per calendar day. The final products are gasoline, heating oils, fuel oils, and petroleum coke. The refinery has been in operation for 32 years. Through a constant modernization program the refinery has been kept completely up-to-date. The oldest processing unit now in operation is only 13 years old. The latest types of catalytic and thermal cracking are represented in the processes employed here. Operations are spread out over a 225-acre area.

Electricity for Processing

Processing consumes the greatest quantity of electric power; 90 per cent of the total purchased is used for this purpose. Almost all of the power is used by electric motors driving centrifugal pumps. Because of the hazards encountered in this type of industry 95 per cent of the motors used are totally enclosed, fan cooled, explosionproof, and designed for use in Class 1, Group D locations. The motors vary in size—the largest unit being 1,500 hp.

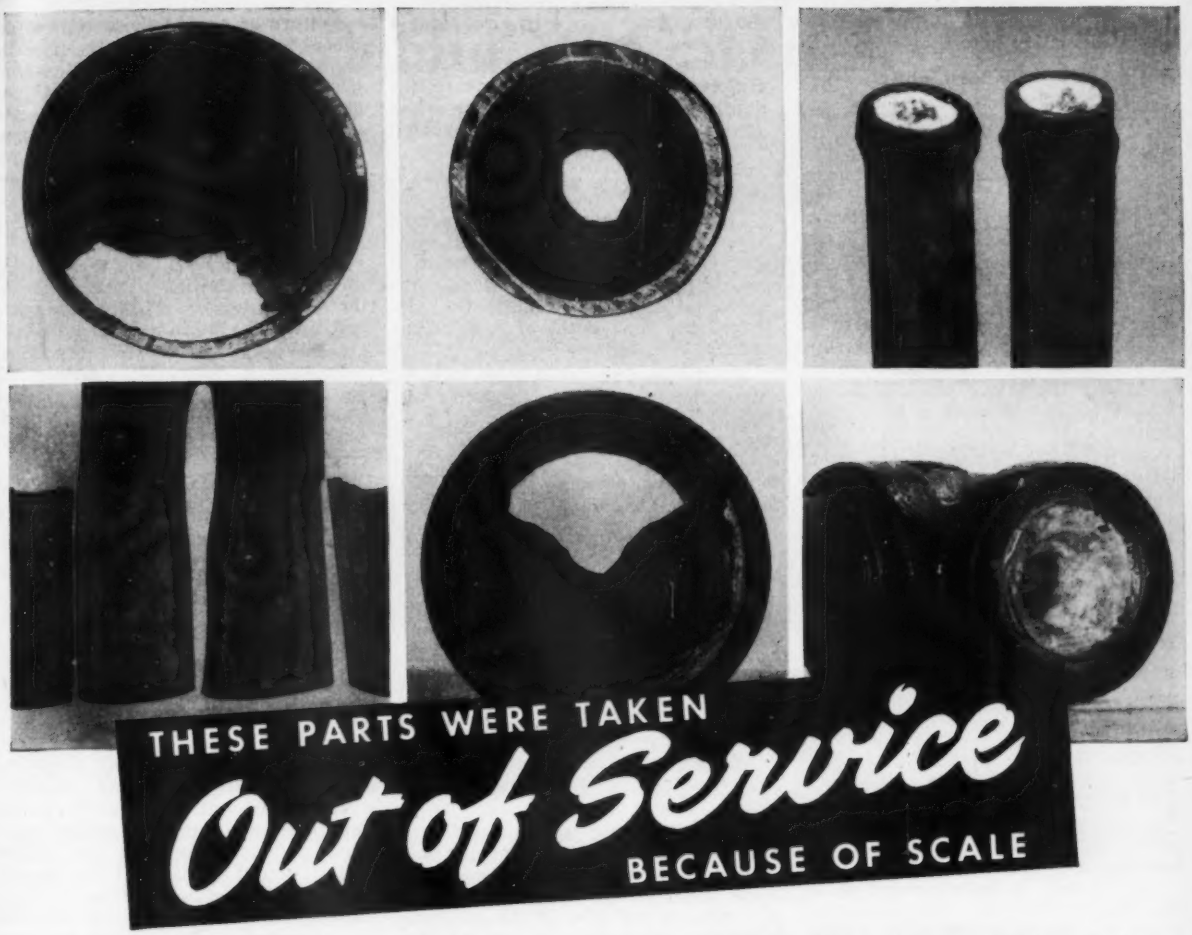
All motors with ratings of ¼ hp. and larger are alternating-current, three-phase, 60-cycle induction units. There are no direct-current or synchronous motors. Motors with 440-volt ratings have been standard; two 350-hp. units are operated at this voltage. A 1,500-hp. motor, installed in 1949, is operated at 2,300 volts.

The following is a tabulation of the total connected motor load in the refinery. This is arranged in groups based on the synchronous speed of the motors and shows the total number and the total horsepower of the motors in each group:

Motor r.p.m.	No. of motors	Total hp.
3,600	138	5,882.75
1,800	262	3,623.5
1,200	43	580.0
900	3	5.5
600	2	700.0
Total	448	10,791.75

It will be noted that 54.5 per cent of the connected horsepower is in two-pole motors and 33.5 per cent of the load is in four-pole motors. As a result, the electrical system is not burdened by the lower power

*Socony-Vacuum Oil Co., Inc., East St. Louis refinery, East St. Louis, Ill. Presented at winter general meeting, A.I.E.E., New York, January 22-26.



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● These destroyed parts represent a large, unnecessary investment in equipment, labor and shut-down time. Conditions like these can easily and economically be avoided with Dearborn Formula 134. Wherever water travels—scale tends to form. Formula 134 is a concentrated solvent for the rapid removal of scale in heat exchange units, boilers, pumps, feed lines, meters, condensers and other valuable equipment.

Formula 134 is just one of many Dearborn formulas used to save equipment, reduce shut-down time and maintenance costs. Other Dearborn formulas control acidity of condensate, prevent excessive foaming and prevent corrosion of metal in contact with calcium and sodium chloride refrigerating brines. For the correct water treatment to best meet your needs—consult Dearborn.

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factor inherent in the design of slow-speed induction motors.

Electricity for Lighting

Light loads account for 10 per cent of the purchased power. Most of the refinery equipment is located out of doors and consists of groups of pressure vessels, heat exchangers, and furnaces with the necessary interconnecting piping and supporting structures. Wherever possible, floodlighting is used in such areas. Local lighting units are used to illuminate gage glasses, at pressure and temperature gages, at sample drawoff points and other similar locations. The lighting system in the operating areas is designed for a range of 3 to 5 foot-candles.

Control rooms and instrument boards are illuminated by recessed fixtures with suitable light-controlling lenses. The fixtures are located so as to keep objectionable glare and reflection to a minimum. Older control rooms have pendant-type fixtures with angle reflectors for instrument board lighting. The luminous ceiling type of lighting system is being considered for future installations.

Pump rooms are lighted by pendant fixtures spaced to give 10 foot-candles. Series street-lighting fixtures with 10,000-lumen lamp bulbs are used for fence and boundary lighting. The tallest structure in the plant, 240 ft. high, is marked with aircraft-warning and obstruction lights.

Like motors, a large percentage of the lighting fixtures are explosion-proof. All locations within the refinery proper are considered hazardous and require Class 1, Group D equipment. The following listed locations are the only exceptions:

1. A boiler house or any other enclosed room containing an open flame that is necessary for the process of making gasoline, etc.

2. All areas throughout the refinery 25 ft. or more aboveground, unless specific conditions indicate otherwise.

3. Any building not used for the manufacturing, handling, or storage of explosive products and sufficiently isolated by a minimum distance of 50 ft. from such operations.

4. Location where no approved or suitably made items are available.

5. Control rooms, provided these rooms are maintained at a positive pressure by means of a blower system receiving its air from a point 25 or more feet above grade.

Lighting loads at each operating unit are served by individual transformers. In the older parts of the plant single phase transformers were installed. These are fed from the 480-volt bus and have 240/120-volt secondaries. Since 1948 three-phase transformers, with 480-volt primary and 208/120-volt secondary, have been used. There are 42 separate lighting transformers in the refinery totaling 940 kva. They range in size from 5 to 75 kva.

In the main refinery area there are 440-volt feeders exclusively for lighting service. In other places the lighting transformers are connected to the available power circuit.

Electricity for Control

For efficient and safe manufacture of products that will meet today's specifications, accurate and positive control of the process is an absolute necessity. Control accounts for less than 1 per cent of the electric power used in the refinery.

Many operations that were formerly dependent upon human ability and skill are now being performed better and safer automatically with control apparatus. Modern temperature and oxygen controllers can fire an oil heater better than any human being can. Electricity powers the instruments for indicating and controlling the temperatures, flows, and pressures at the various units. Remote-control operation of pumps and valves is accomplished electrically. Emergency steam pumps are automatically started by solenoid valves operated from switches that detect loss of flow or pressure from the normal source. Annunciators are used to give indication when critical process variables have exceeded established values.

Accurate timing is the basic control element for some of the refining processes. A motor-driven variable-cycle timer is the heart of the control scheme for one of the catalytic cracking units. This timer directly controls the opening and closing of 51 remote motor-operated valves. The valves are 4, 8, or 12-in., depending upon the application and are used to control the flow of oil, steam, and air through the unit. A mixture of oil and air in the process would be disastrous so there is a system of interlocks to prevent an oil and an air valve being opened at the same time. The timer also checks to see that the valves have operated correctly; in proper sequence the timer also checks pressures, vacuum, and flow at various points on the unit. If any operation has not been properly performed or if flows and pressures are not what they should be the timer stops the process and sounds an alarm. On this installation duplicate timers are installed and maintained. It is possible to switch from one to the other in a matter of seconds. Each timer is capable of initiating 720 separate operations in a predetermined cycle that is adjustable to any time between 36 and 54 minutes.

Timing, combined with flow and level measurement, is the control element for regenerating zeolite softeners at a water-treating plant. Timing controls the regeneration of desiccant used for drying the instrument air supply.

Failure of any of these control devices to function properly can be serious. To insure against failure from loss of power, control circuits are isolated from the processing units' power and lighting services. In some cases there are duplicate-control power transformers and feeders for emergency use.

Electrical Distribution System

Dependability is the influencing factor in the design of the electrical distribution system. This applies within the refinery and to the utility's system outside of the refinery. Modernization of the system within the refinery was completed in March 1950. Fig. 1 shows the power distribution within the company's property.

Electricity is purchased from the public utility at 13,800 volts, three phase, 60 cycles. It is also distributed through the refinery at that voltage. There are two separate incoming feeders from the utility. These feed into opposite end of a 13,800-volt bus. A preferred-emergency scheme is used for feeder selection. If the preferred feeder fails the bus transfers automatically to the emergency feeder, and vice versa. If both feeders fail the bus is energized automatically from whichever feeder is reenergized first.

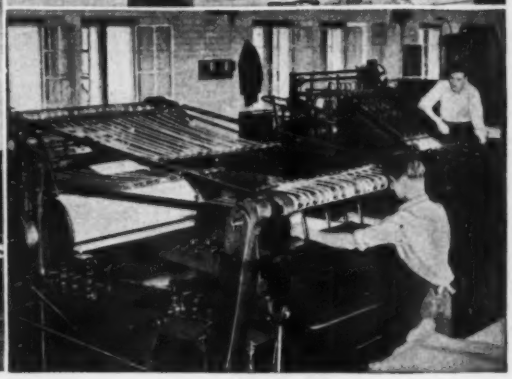
The 13,800-volt distribution switchgear has five outgoing feeder positions and provisions for the future installation of a bus tie if that should ever become desirable. This is 15-kv. metal-clad switchgear with air circuit breakers. The circuit breakers have 500,000-kva. interrupting capacity.

Four of the outgoing feeder positions are used for 13,800-volt distribution to the load center substations located in various parts of the refinery. The fifth position is used as a starter for a 1,500-hp. motor. The motor is directly connected to the 2,300-volt winding of a 2,000-kva. 13,800/2,300-volt transformer. The motor is started and stopped by remotely closing and opening the circuit breaker in the feeder to the transformer.

Load center substations are used for stepping down the 13,800 volts for power utilization. One of these units is a completely outdoor type. The others have the high-voltage disconnect, the transformer, and the low-voltage main breaker outdoors with the 440-volt distribution breakers located indoors. Both liquid-filled and air-break high-voltage disconnects are used. All circuit breakers used are air circuit breakers. Low-voltage and high-voltage disconnects are key interlocked to prevent switching errors.

The stepdown substations, with one exception, are secondary selective. They have two primary feeders, two transformers, and two secondary buses with a tie circuit breaker between the secondary buses. The tie

Behind the Scenes



Auxiliary services of all kinds are involved in Anglo-Iranian's world-wide oil operations; such as dry-docks, laundries, employees' newspapers in Persia, insecticide-testing and scientific film-making in England. They all contribute towards Anglo-Iranian's oil production—255,000,000 barrels in 1949.

101.9

First and Biggest

oil producers in the Middle East since 1912, Anglo-Iranian Oil Company and its associated companies also operate twelve refineries in Europe, Middle East and Australia; their sales organisation includes major marketing or supply interests in Europe, Asia, Africa and Australasia, with international ships' bunkering and aviation services.

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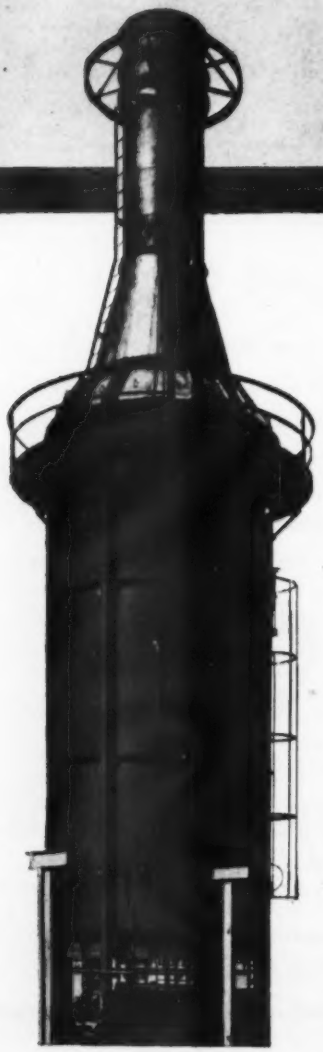
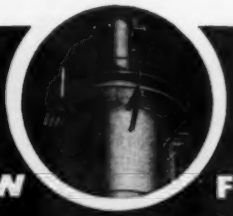


It is significant that as Canada's petroleum industry expands, more and more Petro-Chem Iso-Flow Furnaces are called upon to meet the increasing requirements of oil refineries, pipe lines, gas plants and allied chemical industries...in Canada, as throughout the world, Petro-Chem Iso-Flow Furnaces are demonstrating the unique and superior features inherent in their design.

There is a Petro-Chem Iso-Flow Furnace for every process requirement irrespective of size, capacity or duty. More than 750 are now in satisfactory operation throughout the world.



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is operated normally open and is closed only if, for emergency or maintenance reasons, the whole substation load must be carried by one primary feeder and transformer. The one exception is an ordinary single-circuit stepdown substation. It is located out in a tank farm area where the quality of service required did not justify the expense of duplicate facilities.

Several systems are in use for insuring continuity of service at the processing units. At some units we are satisfied to simply divide the load between two feeders. This means that should one feeder fail the processing unit would not be completely without power and temperatures and flows could be kept under control until repairs are made. In other cases, two feeders are installed with a normally open tie switch between the switchroom buses. In this case, if a feeder fails, the tie can be closed and all equipment at the unit can be operated but at a reduced rate. The electrical load at the crude-oil unit has been divided so as to require two feeders. In this case we have installed a third feeder as a spare, with a manual switching arrangement that will enable the unit to operate with any two of the three feeders.

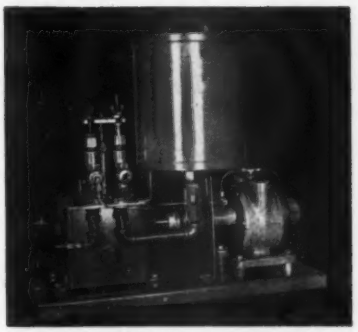
The preferred incoming feeder is completely underground cable from the utility substation to the refinery. The emergency feeder, which originates in a different substation, is partly underground and partly overhead. Within 6 months we expect it to be completely underground. All distribution within the refinery is underground. Separate duct systems have been installed for 13,800-volt distribution and for 440-volt distribution. There are 34 electrical manholes in the refinery. Three conductor, belted, paper and lead cable is used for high-voltage service. Low-voltage cables, are neoprene, thiokol, rubber and lead, or varnished cambric and lead, depending upon the particular application.

Power-System Operation

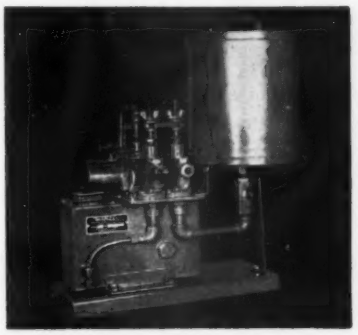
Some information concerning refinery practices will help in understanding the operation of the electric power system. Petroleum refining is a continuous process, 24 hours a day, 7 days a week. While it is necessary to shut down individual parts of the refinery at intervals for inspection and maintenance, these shutdowns are arranged so that the refinery, as a whole, is essentially continuously manufacturing products.

To assure continuous operation, spares are installed for most of the essential equipment. The majority of the spare pumps are steam driven but there is not enough steam equipment to maintain production in the event of a power failure. Normally, the electric drives are used. There are periods when, because of an ex-

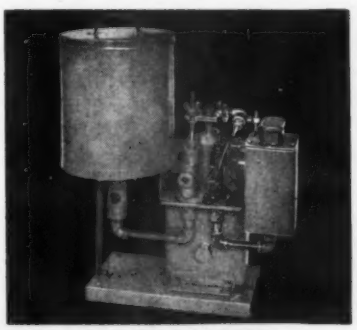
No More *Bad Tanks* of Oil



Self Lubricating Manzel Feeder with Rotary Drive Motor



Self Lubricating Manzel Feeder with Reciprocating Drive Motor



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● Now you can be sure that chemical feeders are working steadily, preventing any possibility of bad tanks—even though they have been unattended for more than 24 hours.

These NEW Manzel Chemical Feeders have built-in force feed lubrication systems. These assure *complete* lubrication of the waste gas-driven motors, preventing the corrosion that frequently causes stoppage. They eliminate excessive manual labor formerly necessary in order to keep feeders constantly operating in wet gas fields.

The Feeders are available with Reciprocating or Rotary Drive Gas Motors, operating on as low as 3 lbs. pressure. They supply any desired amount of chemicals from 1/2 pint per hour up. Or you may obtain kits for conversion of present chemical feeders to force feed lubrication. Ask your Manzel Representative for details or write . . .

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Supposing you have a line carrying liquids or gases coming into your plant and you want to meter the flow accurately. Wouldn't you want to avoid an expensive installation, one that possibly involves a housing or vault for a meter that has to be installed outdoors? That's where the compactness of the Foster Flow Tube will come in handy. You can install it anywhere on the entering line—most of them can be indoors. You install it just as you would a short section of pipe—and as easily. Except to connect valves or regulators, upstream or downstream, you don't even need straight sections.

Coupled with this simplicity of installation is an accuracy comparable in all cases to that of the conventional primary devices; in many cases, a greater accuracy. Foster Flow Tubes are available in all commercial pipe sizes. Write for details and tell us about your processing and installation requirements.

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cess of byproduct gas, it is economically practical to burn the gas to generate steam for power applications. Such conditions are unusual and normal steam generation is used for process work and for heating.

The utility's charge for electric power is based upon total kilowatt hours used, on the largest 15-minute kilowatt demand recorded during the billing period, and upon the cost of fuel. There is no power-factor clause in the power contract. The only factors that can be controlled are demand and the quantity used.

In the past it has not been economically justifiable to try to control either of these items. However, because of the trend toward larger motor drives it will be advisable to control these factors in the future. The following tabulation showing the 15-minute monthly load factors during the first 6 months of 1949 and the corresponding period in 1950 will illustrate this point. In these cases total monthly kilowatt-hour consumption is close enough to warrant this comparison.

	Per cent					
	Jan.	Feb.	Mar.	Apr.	May	June
1949	80	84	78	84	80	82
1950	82	86	83	74	66	71

Our experience has shown that load factors above 80 per cent are practical and should be attained. Economical operation is dependent on this factor.

The following data for the month of August 1950 is typical for present refinery electrical system operation:

Kilowatt-hours	2,603,600
Max. 15-minute demand, kw.	4,780.8
Max. instantaneous demand, kw.	4,940.0
15-minute monthly load factor, %	73.4
Demand factor, %	60.2

Purchased power, when examined from the standpoint of quality, convenience, adaptability, dependability, and economy, has satisfied the power requirements for the East St. Louis refinery. By the same reasoning the refinery is a desirable load from the utility's viewpoint.

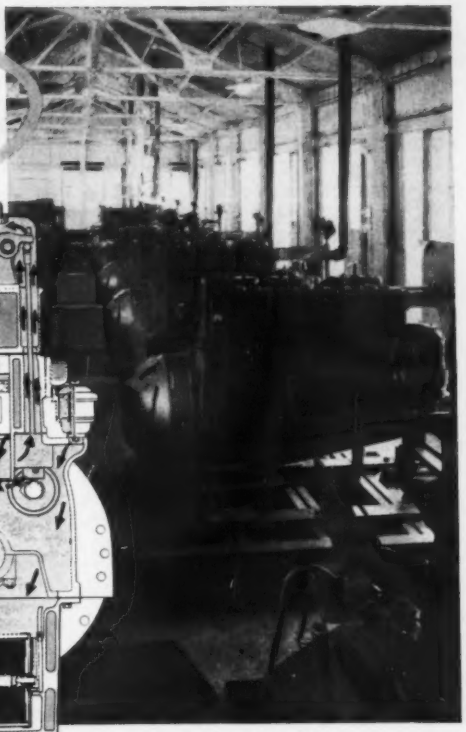
BOOKS

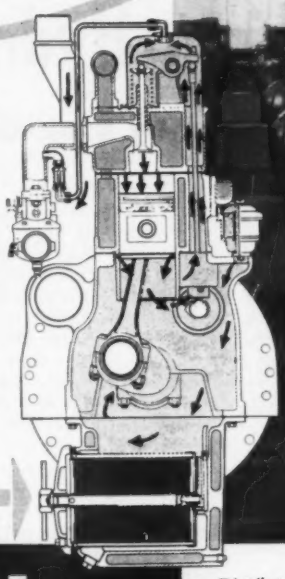
CANADIAN PIPE LINE. An industrial film, produced by Richard Finnie for Bechtel Corp., 220 Bush Street, San Francisco.

This is another in a series of documentary film records of Bechtel-built projects at home and abroad. It is a 30-minute 16-mm. picture in color and sound telling the story of the construction of the 450-mile 20-in. pipe line between Edmonton and Regina which went into service early in October. This line is part of a 1,200-mile system carrying crude oil to the head of the Great Lakes at Superior, Wis., thence to be moved by tanker to a refinery at Sarnia, Ont. The Edmonton-Regina increment was laid for Interprovincial Pipe Line Co. by Canadian Bechtel Ltd., Toronto, and Fred Mannix & Co., Ltd., Calgary, Alta. Prints of the film may be borrowed for showing before engineering groups and others interested in pipe-line construction and Canadian petroleum development.

MINNEAPOLIS MOLINE MM MODERN MACHINERY

OILFIELD POWER
WITH HEAT EXCHANGER BASE PAN!





MM HEAT EXCHANGER BASE PAN maintains uniform operating temperature from top to bottom of the engine regardless of load or atmospheric temperature. This results in a sludge-free engine . . . best oil filtering . . . greatly extended periods between servicing . . . far fewer oil changes . . . and greatly prolonged engine life.

HERE'S HOW IT WORKS: The base pan is cast with water jackets just like the cylinder blocks and heads. A heavy-duty by-pass thermostat diverts the water from the outlet manifold through the base pan jacket and back through the pump and engine. Circulating the hot water around the oil in the pan eliminates outside radiation and maintains 165-180° temperature for ideal lubrication and filtering.

Positive Vacuum Crankcase Ventilation draws 2 to 3 cu. ft. of fresh air per minute through a metering valve. After mixing with oil-contaminating gases, raw and burned, it is withdrawn through the cylinder head covers and into the intake manifold. Investigate MM Oil Field Power . . . the engine with lower field service cost.

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● Here are the keys to economical high pressure and high temperature steam trapping. One is a new inexpensive forged steel steam trap just designed for high pressure super heated steam conditions in oil refineries up to 500 p.s.i. and 800° total temperature. Made in popular ½ inch and ¾ inch sizes with a recessed gasket to prevent blowing out, these sturdy forged traps are shock and explosion proof. The other key to economical trapping is a new edition of a book "Solving Steam Trap Problems" that gives all the cost cutting advantages of this trap . . . plus how to install, blow down and repair steam traps in the shortest possible time at the lowest cost. Mail coupon for your complimentary copy today.

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Observations and Problems in

Recovery and Retention of Light Hydrocarbons

by A. M. L. Kube*

AT the beginning of the natural-gasoline business, one of the big problems facing the industry was the question of providing economical methods for the disposal of the light-hydrocarbon fractions. At that time the composition of the light components was not known but the problem existed just the same. Even hydrocarbons as heavy as butanes were in many cases a byproduct which were unwanted by the manufacturer. It was soon realized that if the byproducts could be sold for more than residue prices, the main product could be sold at a lower price, and the owner could still meet competition with the same margin of profit.

To sell the so-called byproducts not only called for additional purification facilities in the gasoline plants but also required the opening of a new industry, namely, the development and sale of equipment to utilize safely the L.P.G. products for fuel where natural gas was not available. All of this required tremendous sales effort by the manufacturers of L.P.G. products and the manufacturers of the L.P.G. burning equipment.

An outstanding example of what can be done with L.P.G. on the farm is found in the Texas Panhandle. Practically all farms in this area are now modernized with the help of L.P.G. products. In addition to using the products for fuel in their homes, many farmers are finding that they make a very good and economical fuel for tractors, stationary engines, and weed-burning equipment. Engine manufacturers have been convinced that L.P.G. is here to stay and are now equipping some of their products with L.P.G. tanks and carburetors.

Although great progress has been made in the sale and use of L.P.G. products, the industry is still faced with a problem of L.P.G. shortage in the winter time while in the summer time production must be curtailed due to lack of demand and good, cheap seasonal storage.

Kremser and Brown Equations

Continual increases in L.P.G. demand caused producers to realize that this was a lucrative business and to look for more economical ways of producing the light hydrocarbons in order that they could be sold at a lower price and thereby attract more consumers. It was this kind of thinking that prompted such brilliant men as Kremser and Brown and others to devote much time to the development of formula which would describe the absorption process and would enable designers to predict the results which could be expected from an absorption system.

About 20 years ago Kemser published his famous equation describing the absorption principle. His work was later modified by Brown. The formulas which these two men presented are now used almost exclusively in the designing of new plants and in checking the efficiencies of those plants already in operation.

The absorption-factor equations developed by these men are very familiar to designers in the gasoline industry; however, there are others who do not actively use the equations and have therefore become less familiar with their characteristics. For the benefit of this last group the equations are being presented for review.

Form 1

$$Y_r = Y_{n+1}\frac{(A-1)}{(A^{n+1}-1)} + Y_o\frac{(A^{n+1}-A)}{(A^{n+1}-1)}$$

Form 2

$$\frac{Y_{n+1}-Y_r}{Y_{n+1}-Y_o} = \frac{A^{n+1}-A}{A^{n+1}-1}$$

where

Y_r = concentration of any component in the residue gas.

Y_{n+1} = concentration of any component in the raw gas.

Y_o = concentration of any component in equilibrium with the lean oil entering the absorbers.

n = number of theoretical trays.

$A = \frac{3.156\,d\,G}{KM} = \frac{L}{KV}$ = absorption factor.

d = density of lean oil.

G = oil to gas ratio. (Gallons oil per 1,000 cu. ft. gas.)

K = Y/X = equilibrium constant at absorber temperature and pressure.

M = molecular weight of lean oil.

L = mols of lean oil.

V = mols of gas.

Y = mol fraction of any component in the vapor phase in equilibrium with the liquid.

X = mol fraction of any component in the liquid phase in equilibrium with the vapor.

In studying the equations it will be noted that the term $Y_{n+1}\frac{(A-1)}{(A^{n+1}-1)}$ in Form 1 represents the mol fraction of any one hydrocarbon which is not absorbed while the gas travels the length of the absorber from bottom to top. The other term $Y_o\frac{(A^{n+1}-A)}{(A^{n+1}-1)}$ represents the mol fraction of hydrocarbon in a vapor phase existing in equilibrium with a partially denuded lean oil which would be lost into the absorber's residue stream almost as soon as the partially denuded oil entered the absorber. If, however, the lean oil entering the absorber is perfectly stripped then $Y_o = 0$ and the term Y_r becomes equal to the mol fraction of the hydrocarbon in the residue gas which is due entirely to incomplete absorption of raw gas.

If the lean oil entering the absorber is not perfectly stripped then the amount not absorbed from the inlet gas must be added to the mols of the same hydrocarbon in equilibrium with the oil entering the absorber. In designing a new plant, it is often assumed that the oil entering the absorber is completely denuded but when the unit is started it is found that some pentanes are being lost in the residue gas even though the absorber was designed for 100 per cent absorption. This is usually due to the fact that the oil is not completely stripped in the still.

As the absorption factor, A, increases in the term $Y_{n+1}\frac{(A-1)}{(A^{n+1}-1)}$ (Form 1), that term approaches zero and as A increases in the term $Y_o\frac{(A^{n+1}-A)}{(A^{n+1}-1)}$ it approaches Y_o which is the concentration of the hydrocar-

*Phillips Petroleum Co., Bartlesville, Okla. Presented at regional meeting, Natural Gasoline Association of America, December 1950, Amarillo, Tex.

bon in equilibrium with the lean oil. This means simply that no matter how good the absorption process may be, the hydrocarbon content of the residue gas can never be reduced below the amount of any component which is in equilibrium with the denuded oil entering the top of the absorber.

The second form of the equation is very nearly the same as the first but is stated in a different manner. It states simply in the left term that the total amount of actual change in concentration of any one hydrocarbon divided by the total possible change of concentration of that hydrocarbon is equal to the fraction of that hydrocarbon which is absorbed. Again the term Y_o appears and it will be noted that as Y_o is decreased the fraction absorbed increases. Maximum absorption is attained when $Y_o = 0$.

In both forms of the equations the absorption factor $A = L/KV$ or the ratio of mols of liquid to mols of gas divided by the equilibrium constant K. This constant is equal to the mol fraction of hydrocarbon in the vapor phase in equilibrium with the liquid phase divided by the mol fraction of the hydrocarbon in the liquid phase. Further analysis shows that K is dependent upon temperature and pressure and seemingly indicates that the highest pressure and the lowest temperature would make the highest absorption efficiency possible.

The Absorption System

Now that the function of the absorption factor equation has been briefly discussed, it will be well to examine some of the practical applications of this equation in a gasoline plant absorption system. Fig. 1 is a series of curves for a typical absorber showing the fraction of hydrocarbons in the oil stream as they exist on each of the trays as the gas travels from the bottom to the top and the oil and absorbed hydrocarbons travel from top to bottom.

It will be noted that the curve showing the fraction of pentanes and heavier hydrocarbons absorbed in the oil in this particular case ends at about the midpoint of the absorber. This indicates that not all the trays are required to absorb approximately 100 per cent of this product. The normal butane curve takes on a shape which has a slope in the same general direction as the pentanes and heavier curve; however, it will be noted that not all of the normal butane was absorbed, indicating that more trays would be required to absorb all that product. The isobutane curve seems to take an intermediate position between the butanes and heavier composition curves and the propane and lighter curve.

The lighter hydrocarbon fractions made a curve which in the lower part of the absorber is opposite in direction to the butane and heavier curve. There are several reasons for the curves taking on the shapes as seen in Fig. 1. By a close study of the conditions it will be noted that the methane is absorbed on the top tray and then, some of the methane is given up by the oil on each subsequent tray in its downward travel. This release of methane from the oil is partly due to the fact that as more and more of the heavier hydrocarbons are absorbed in the oil, the heat of absorption increases, raising the temperature of the oil which in turn causes some of the lighter hydrocarbons that had been absorbed in the top tray of the absorber to be released due to a change in equilibrium conditions.

In addition, as more and more of the heavier hydrocarbons are absorbed, the oil becomes saturated with heavier products which tend to displace methane, ethane, and propane previously absorbed at the top. These lighter fractions or products are replaced by the heavier fractions almost in direct proportion to their respective vapor pressures. Consequently, very small fractions of lighter components are replaced by proportionally larger amounts of heavier hydrocarbons. Such an exchange will explain the reason why the heavier ends are those which remain more easily in the rich oil. For these reasons the methane, ethane, and propane curves show a slight decrease as the oil approaches the absorber bottom.

Fig. 1-A represents the effect of higher pressure or lower temperature on the absorption system. Either one or both of the equilibrium changes would cause an increased absorption of the various components in the system similar to that shown by the dashed line in the curves. This is very important as many times either one or the other of the conditions may be changed to effect better absorption. It should also be remembered that reduced pressure or increased temperature causes a decrease in absorption efficiency.

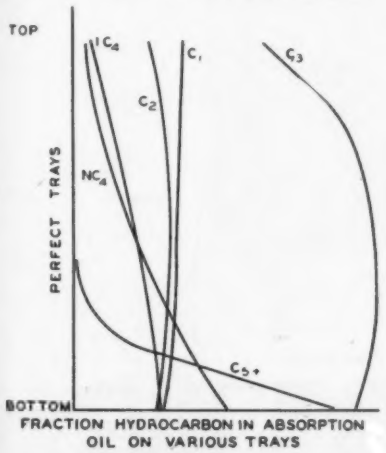

Fig. 1—Typical absorber tray-to-tray absorption.

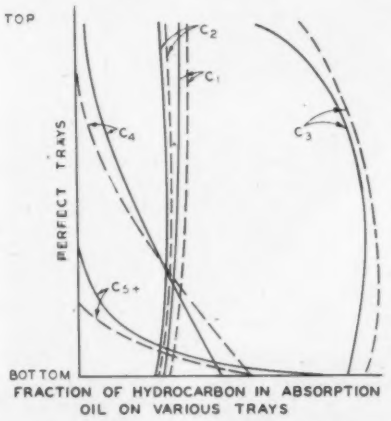

Fig. 1a—Typical absorber effect of increased pressure or decreased temperature on absorption.

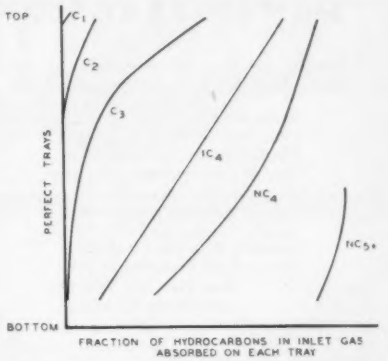

Fig. 2—Typical absorber tray-to-tray absorption.

Fig. 2 represents the same data as Fig. 1 but it shows the fraction of each hydrocarbon which was absorbed at various trays in the vessel. It will be noted that the general direction of the curves is similar to those shown in Fig. 1 which represented the fraction of each hydrocarbon in the liquid stream. It must be realized that this set of curves is for one specific condition out of a possible infinite number. Temperature, pressure, oil rate, gas volume, molecular weight, and density of the oil all affect the absorption. To change any one of these would necessitate the preparation of a new set of curves.

Examination of the partial pressure of the various hydrocarbons gives answer to the problem of why the quantity of methane, ethane, and propane in the absorber decreases as shown in Figs. 1 and 1-A. If equilibrium conditions are assumed to exist on each perfect tray, then the vapor pressure of all the hydrocarbon constituents on the individual trays must equal the total pressure on the system.

Further analysis shows that roughly 90 per cent of the total vapor pressure is exerted by the relatively small amount of methane. If the methane could be removed the oil

TABLE 1—COMPONENT VAPOR PRESSURES

Component—	Vapor pressure at 100° F.	Ratio
Methane	approx. 5,000*	
Ethane	approx. 800*	6.25
Propane	187	4.3
Isobutane	73.7	2.6
Normal butane	52.2	1.4
Pentane	15.6	3.3

*Extrapolated above the critical temperature.

could absorb more of the desirable hydrocarbons in proportionally higher quantities. Vapor pressures are the primary consideration in hydrocarbon processing. Table 1, component vapor pressures, shows the ratio of the vapor pressures of the lighter hydrocarbon to the next heavier product. The ratios divided by the absorber efficiency gives the number of mols of the heavier hydrocarbon needed to displace one mol of the lighter constituent.

One way to reduce the amount of methane and ethane in the oil is to introduce a propane-rich vapor stream into the bottom of the absorber as illustrated in Fig. 3. The methane and ethane will be reduced proportionally according to the amount of propane absorbed. This phenomenon is shown by the dashed lines. Assuming the combined vapor pressures of methane and ethane to be 3,000 psia. and the vapor pressure of the propane stream to be 200 psia., then it would require 15 mols of propane to displace 1 mol of the methane-ethane mixture. If normally 50 per cent of the propane is absorbed, 30 mols of propane will be required to rid the system of 1 mol of methane and ethane.

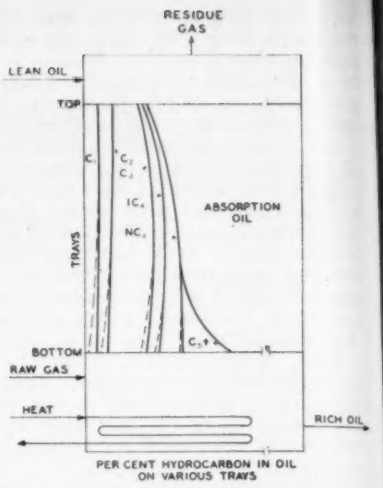

Fig. 3

The foregoing is not exactly true as the heat of absorption will increase as more propane is absorbed which will in turn increase the rate at which the light constituents are liberated and will also decrease the amount of propane absorbed. Even though the injection of propane-rich vapors in the bottom of the absorber to displace methane and ethane may not be the most economical method of eliminating the light components in all cases, it can be used to good advantage in some of the plants now operating which do not have adequate fractionating facilities for maximum propane recovery.

In some cases it would be profitable to make a light depropanizing cut in the fractionating system and inject the overhead vapors into the absorber to unload the rich-oil stream of methane and ethane. After a suffi-

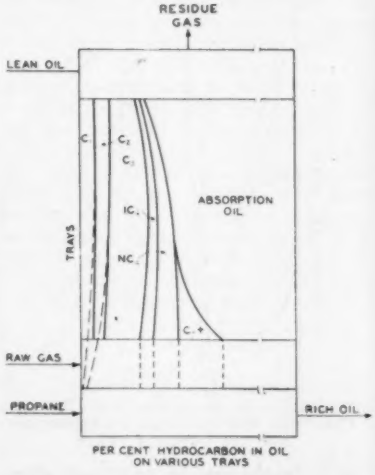

Fig. 4

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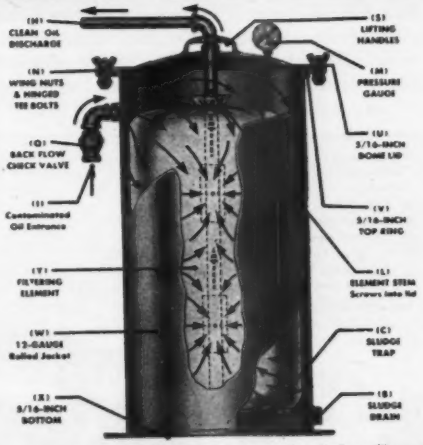
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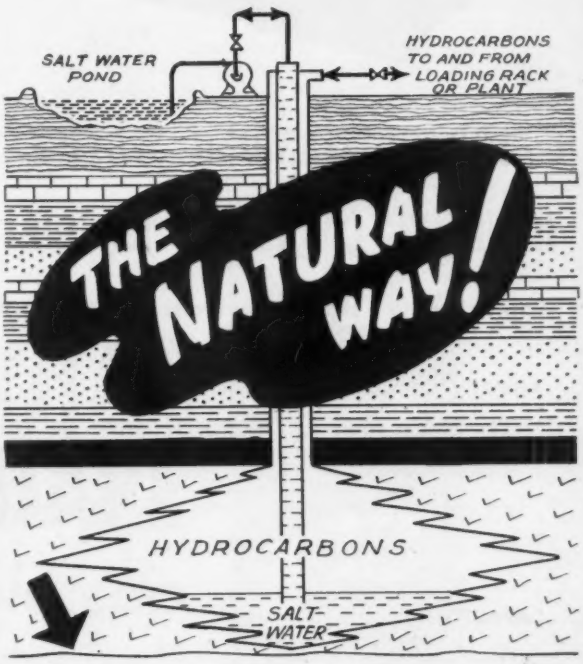

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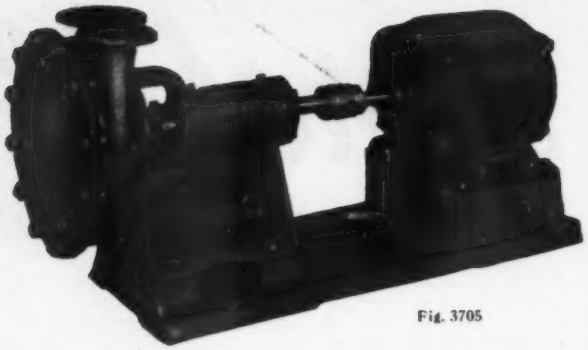

Fig. 3705

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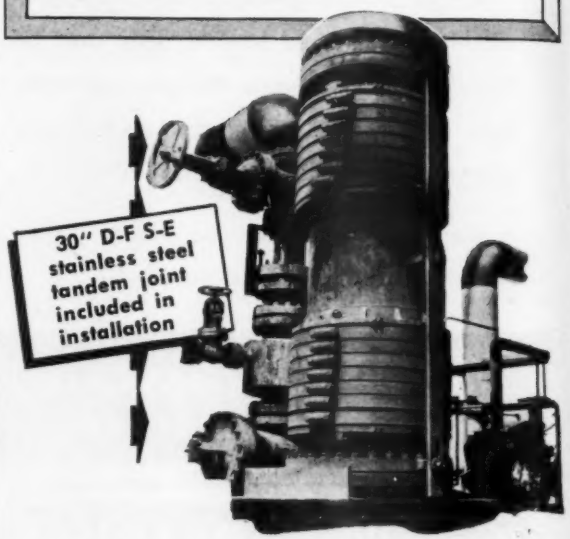

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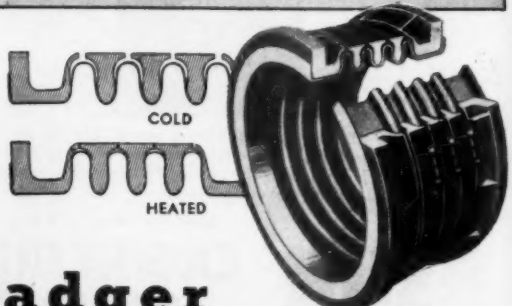

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cient recycle has been built up the vapor pressure of the product will be substantially decreased and consequently a higher propane recovery and purity in the final plant production will be possible.

In Fig. 4 a typical absorber is shown with its relative amounts of hydrocarbons in the liquid traveling down the absorber. The dashed lines in this chart represent the slope the hydrocarbon curves would be expected to take if heat were added to the bottom of the absorber. In this case the absorber becomes a fractionator with the total liquid stream acting as reflux for the system. Here vapor pressure of the liquid is reduced by application of heat and subsequent removal of methane and ethane. Similar results are accomplished by the use of a flash tank, the vapors of which are processed in a reabsorber or returned to the absorber by a compressor.

Fig. 5 represents the effect of re-

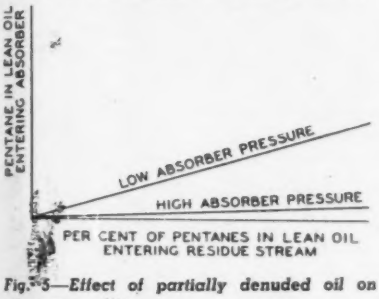
PENTANE IN LEAN OIL ENTERING ABSORBER
LOW ABSORBER PRESSURE
HIGH ABSORBER PRESSURE
PER CENT OF PENTANES IN LEAN OIL ENTERING RESIDUE STREAM

Fig. 5—Effect of partially denuded oil on absorption efficiency.

turning from the still to the absorber partially denuded oil containing pentanes. These curves show that the amount of pentane which will be rejected by the lean oil in the top trays of an absorber depends largely upon pressure of the system. Less pentanes are lost due to stripping at high absorber pressure than at low pressure. The stripping action is most easily understood if the top part of the absorber is considered as a still operating at a very low temperature. Since the lean gas traveling up the absorber contains a very small amount of pentanes enough of that component will be released from the oil to satisfy the equilibrium conditions. This pentane vapor will be carried off in the residue gas and is lost production in addition to that not absorbed from the rich gas. The amount of pentanes in equilibrium with the lean oil is represented by Y_o in the absorption equation and by an analysis of that equation it can be seen that the absorption system can do nothing to recover these vapors.

Rich-Oil Demethanizer

Operating costs and production efficiencies are being watched more closely now than ever before. Designers are searching continuously for new methods that may be applied to both old and new plants to bring down costs and to increase production to the extent that marginal situations may be made profitable. Because of this, the rich-oil demethanizer is being used in many plants with a resultant decrease in fractionation and recompression costs. It should, however, be understood that the rich-oil demethanizer may not be found economical in all cases. Therefore, each situation must be carefully analyzed prior to incorporating this equipment in a given operation.

The principle of demethanizer operation is simply a rearrangement of some of the principles used in the absorption and stripping operations. A typical flow arrangement is shown in Fig. 6. Rich oil from the absorber is heated in most instances prior to entering the vessel thus forcing a change in the equilibrium to drive off a portion of all the hydrocarbons which were absorbed in the oil. These vapors along with the vapors released in the bottom of the vessel are then stripped of ethane and heavier hydrocarbons in the top part of the unit with a lean-oil side stream taken from the main oil stream to the absorber.

To obtain maximum absorption with minimum oil circulation in the demethanizer the oil is cooled in the upper part of the vessel. To strip a maximum amount of methane from the oil a heating element is provided in the bottom of the vessel. Some of

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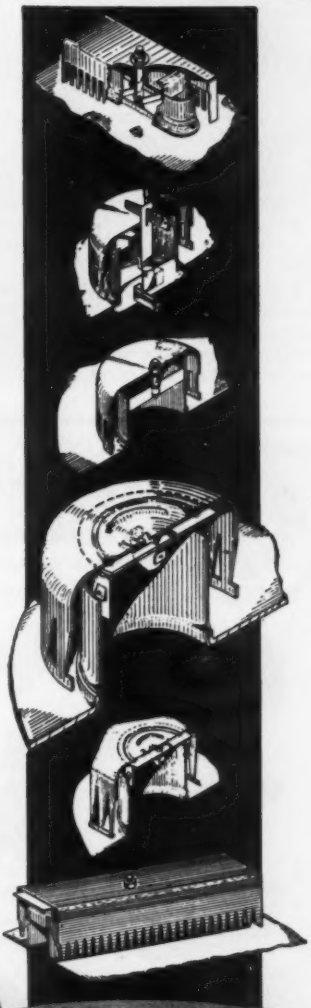

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the designers even inject steam in the bottom of the vessel further to denude the oil of undesirable hydrocarbon fractions.

The principle of the rich-oil demethanizer is not new. Each phase of the operation has previously been used, either in the absorber or in the still. The reason for its current popularity is the fact that more propane may be produced cheaply to meet growing demands and competition.

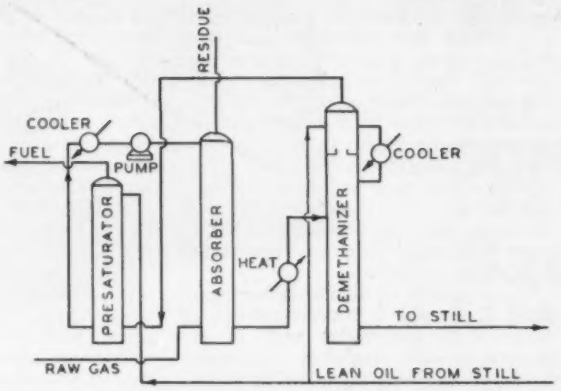


Fig. 6—Typical flow of absorption and demethanization system.

Since the components giving the greatest difficulty at both places have been removed from the rich-oil stream, many plants are now being built without recompressors. By cutting deeper and removing the ethane, thus making the unit a deethanizer instead of a demethanizer, it is possible to make specification propane without a deethanizing fractionator.

In plants employing rich-oil demethanizers, it is often found that sufficient methane is removed from the process to produce a good-quality ethane in the fractionation system if that product were desired. Since same plants are already using ethane as feed stock for other processes, there is little doubt that in the near future the product will be in great demand.

From Fig. 7 it can be seen that when hydrocarbons are absorbed in oil, the temperature of the system is increased due to the heat of absorption. Although this curve shows the heat of absorption due to the total hydrocarbon absorbed, it can be said that the heat of absorption varies with the individual components. The heaviest components have the greatest heat of absorption per cubic foot. To partially overcome this

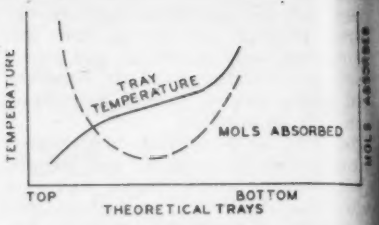
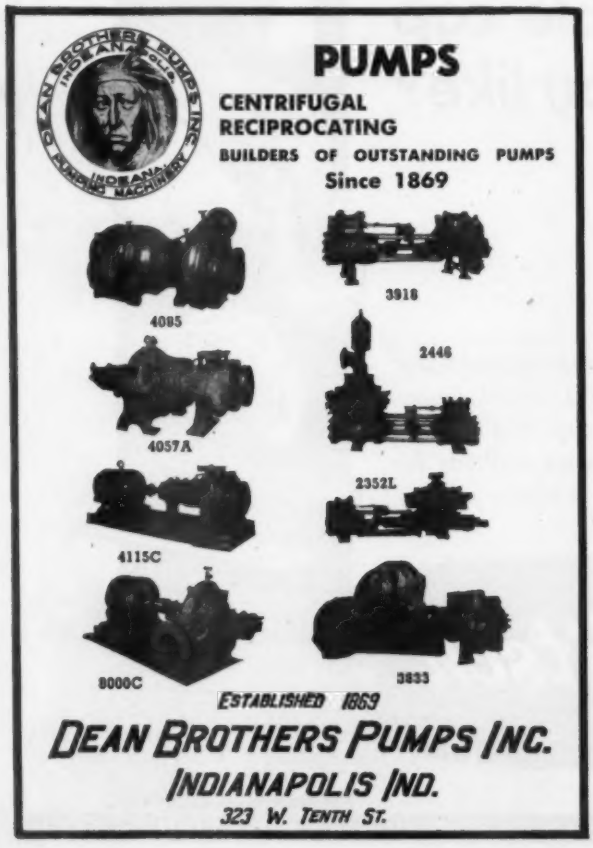


Fig. 7—Absorber temperature and total mols hydrocarbons absorbed on various trays.

effect, many designers specify the lean-oil presaturator, shown in Fig. 6. In this operation lean oil going to the absorber is saturated with methane and ethane vapors from the demethanizer and much of the heat of absorption is taken outside the absorber. The oil is then cooled and injected in the absorber in the usual manner. Since the oil is already saturated with lighter ends prior to its entering the absorber, very small portions of the light components are absorbed from the raw gas and some of the methane and ethane entering the absorber in the oil will be displaced by propane. It has been previously pointed out that this could be done by replacing 1 mol of methane-ethane mixture with approximately 30 mols of recycled propane.

After the rich oil leaves the absorber or demethanizer, if one is used,



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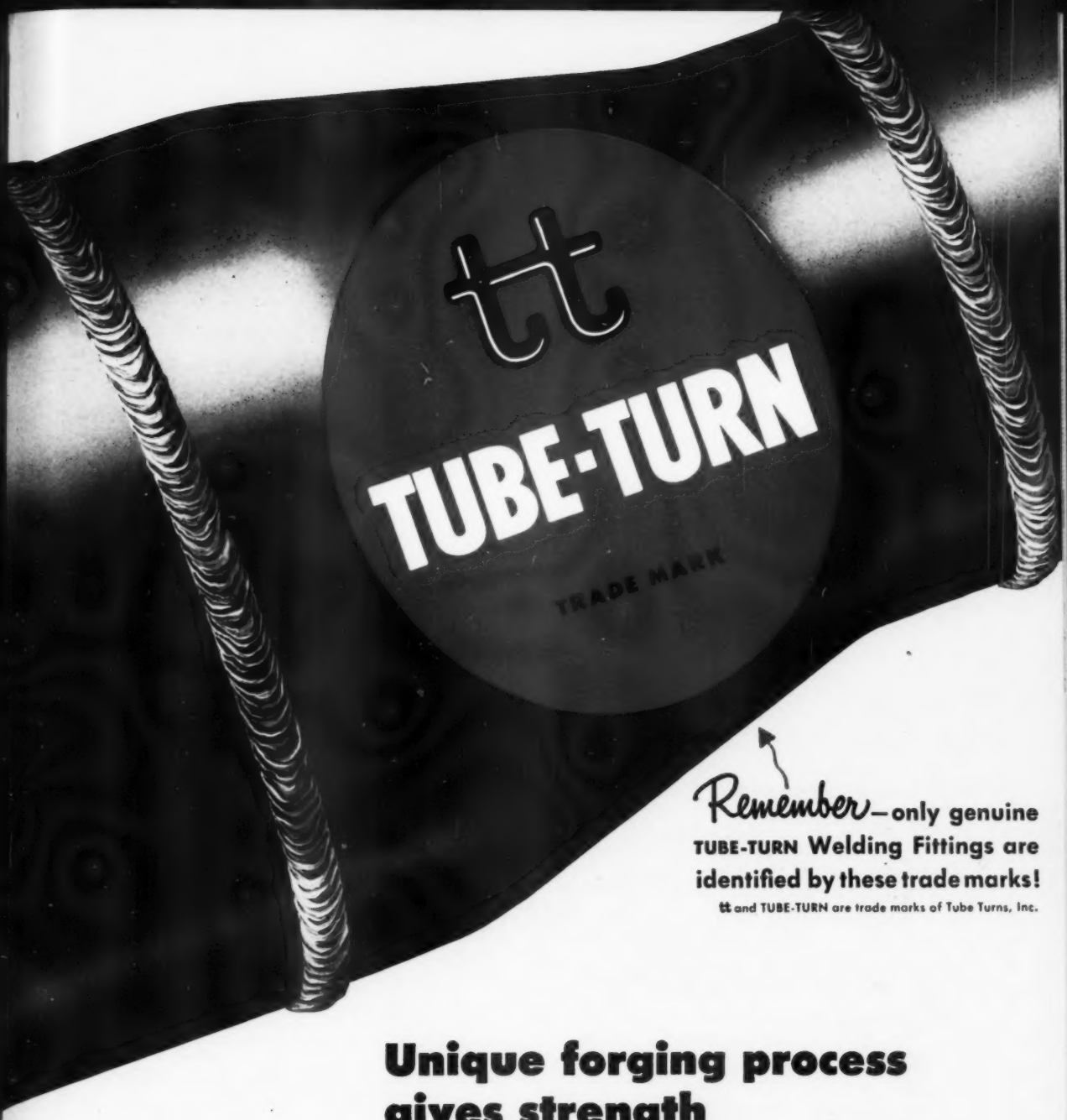

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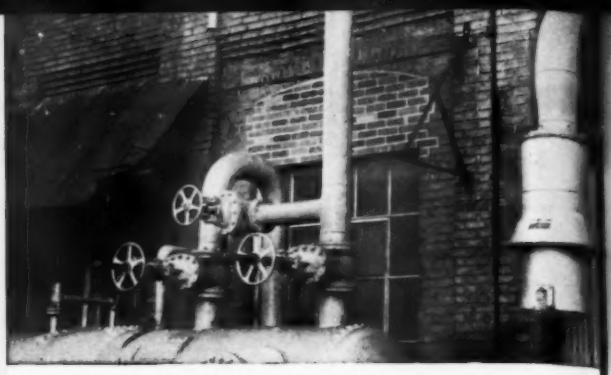

Fig. 1. Air compressor piping

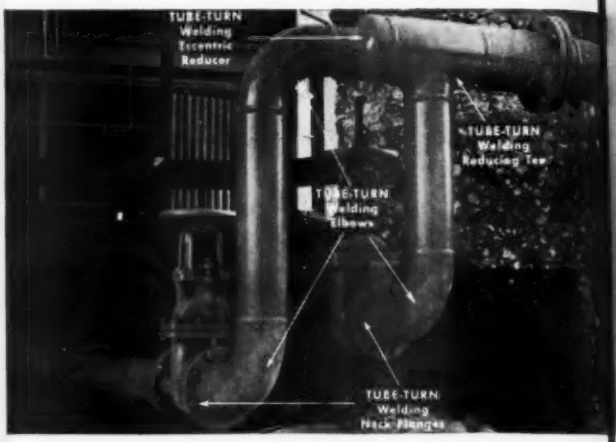

Fig. 2. Air line manifold

Fig. 3. Cutting welding fitting

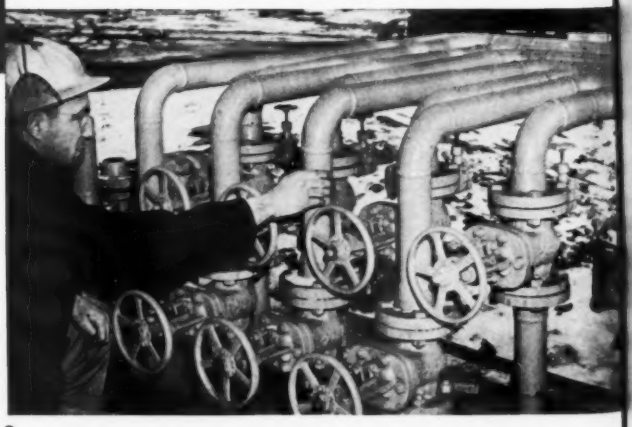

Fig. 4. Fire foam chemical manifold

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it is heated and vented in various stages and delivered to the still for complete stripping. The action of the stripper is directly opposite from that of the gas absorber since low pressures and high temperatures are the conditions conducive to efficient stripping. We have previously considered the effect of poor stripping on the performance of the absorber, therefore, it can be seen that the ultimate aim is to completely denude the oil before it is returned to the absorber.

After preheating, the oil enters the stripper on the top tray and steam is usually injected into the bottom of that vessel to release as much of the gasoline vapors from the oil as possible. The steam and oil vapors carried over from the still are then knocked out in the dephlegmator vessel while gasoline vapors proceed to the condensing cycle.

Some designers are now specifying two stills operating at different pressures to carry out the stripping operation. The purpose of this arrangement is to eliminate recompressors in the plant with a saving in operating costs. The high-pressure still operates to partially denude the oil and the vapors may or may not be totally condensed depending on the pressure and temperature conditions and previous preparation of the rich oil. The hot oil then travels from the first still to the low-pressure still for complete stripping; the effluent vapors are then totally condensed. However, it must be remembered that a double-still arrangement sometimes requires more steam than one low-pressure still. This must also be taken into consideration when checking economics of the various systems.

The efficient operation of a still is dependent upon a number of variables, each of which must be taken into consideration to determine the optimum operating conditions of the stripper. Fig. 8 represents the effect of steam on stripping with constant still temperature and pressure. It will be noted that as the steam rate is increased, the amount of pentanes remaining in the oil will be decreased. However, there are limiting factors that must be considered in determining the amount of steam which can be injected into the still. In practical operation such other factors as still and dephlegmator capacities must also be investigated in arriving at the maximum over-all efficiency.

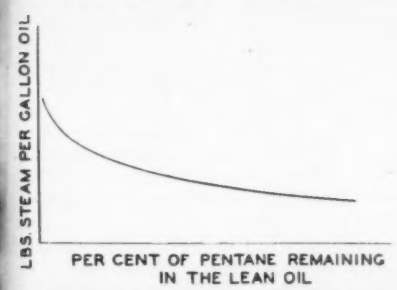

Fig. 8—Effect of steam on stripper operation.

Figs. 9 and 10 show the effect of temperature and pressure on the stripping process. From the curves, it can readily be seen that the lowest pressure and highest temperature with a given steam rate, result in the

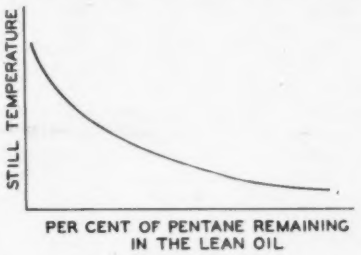

Fig. 9—Effect of temperature on stripper operation.

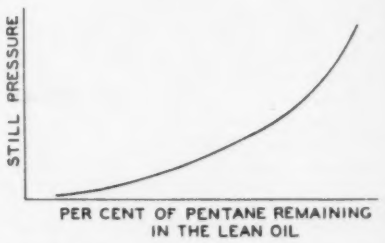

Fig. 10—Effect of pressure on stripper operation.

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highest stripping efficiency. It is often necessary to compromise both temperatures and pressures since the steam temperatures and various plant pressures are usually limiting factors.

Fractionation System

After the gasoline has been extracted from natural gas by the absorption process and partially stabilized by various intermediate processes between the absorbers and the strippers, it must usually be processed further by fractionation to provide an end product to meet certain rigid specifications. In setting up the fractionation system, the two most common problems confronting engineers are the sequence in which the fractionation steps should be performed and the capacity of the fractionators.

There are various flow arrangements which may be used in the fractionation system for a gasoline plant, and usually the desired products determine this arrangement. For this discussion a plant which is to produce propane, butane, and 12-lb. gasoline will be used. Fig. 11 shows the process flow most generally accepted. In this fractionator arrangement, methane and ethane are first removed so that these products, which in most cases are undesirable, can be returned to the residue or fuel system without further interference. The deethanization cut should be such that specification propane can be made in the next step of the fractionating system.

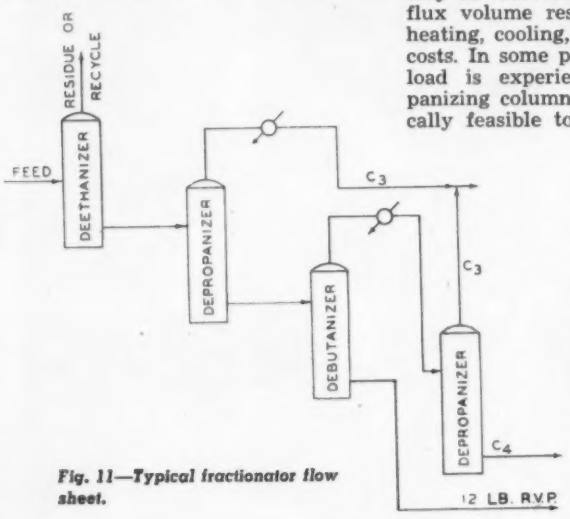


Fig. 11—Typical fractionator flow sheet.

The kettle product containing propane and heavier components next flows to the depropanizer column, where specification propane is made overhead. To keep all butanes out of the overhead product in the depropanizer, it is sometimes necessary to leave considerable propane in the kettle product. This propane is removed along with the butane in the debutanizing column overhead. The overhead product from this vessel flows to a second depropanizer or cleanup column, where specification propane is made overhead and butanes are produced in the kettle.

Double fractionation to produce propane and butanes has several advantages. For instance, if a good cut were desired between propane and butanes in the total stream, a reflux ratio of 2 to 5 gal. per gallon of feed would be required; whereas, if a poor cut in the depropanization operation could be made, the ratio of reflux to feed would have to be only 0.5 to 1.0 gal. The propane remaining in the debutanizer overhead can be easily removed in the small cleanup column.

The small column would require a high reflux ratio but due to the small amount processed the total gallons of reflux would be relatively small. Thus, if the gallons of reflux in the first and second steps of depropanization were added, their total would normally be smaller than would be required to make a single clean cut between propane and butanes on the total feed stream and, in addition, a better-quality propane or butane may be recovered. A reduction in reflux volume results in a saving on heating, cooling, and pump operating costs. In some plants where an overload is experienced in the depropanizing column, it may be economically feasible to add a second fractionator which would be justified by lower operating costs and increased product purity.

Fractionator capacity is something often talked about but due to the many variables involved, the term means very little unless some of the variables are considered. A few of the factors affecting fractionator capacity are:

Column diameter
Number of trays
Tray spacing
Tray design
Working pressure
Operating pressure
Purity of product
Feed entry location
Feed temperature
Feed composition
Feed volume fluctuation
Feed condition—vapor or liquid
Steam temperature
Condensing temperature

There are many other variables but this list will suffice to show that "fractionator capacity" is a very elusive term.

As long as a product of constant composition is being made and feed composition is kept fairly constant, fractionator capacity is quite easily determined. However, even with ideal feed and product conditions there is a possibility of considerable product loss and excess steam consumption due to the fractionator operating at a pressure which is too high or too low for optimum performance.

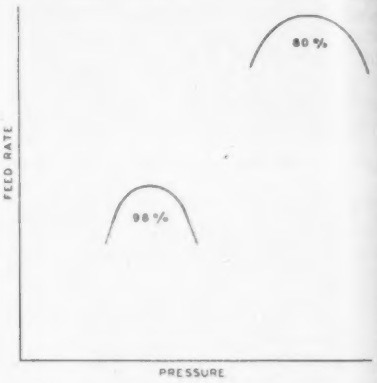


Fig. 12—Optimum fractionator capacity.

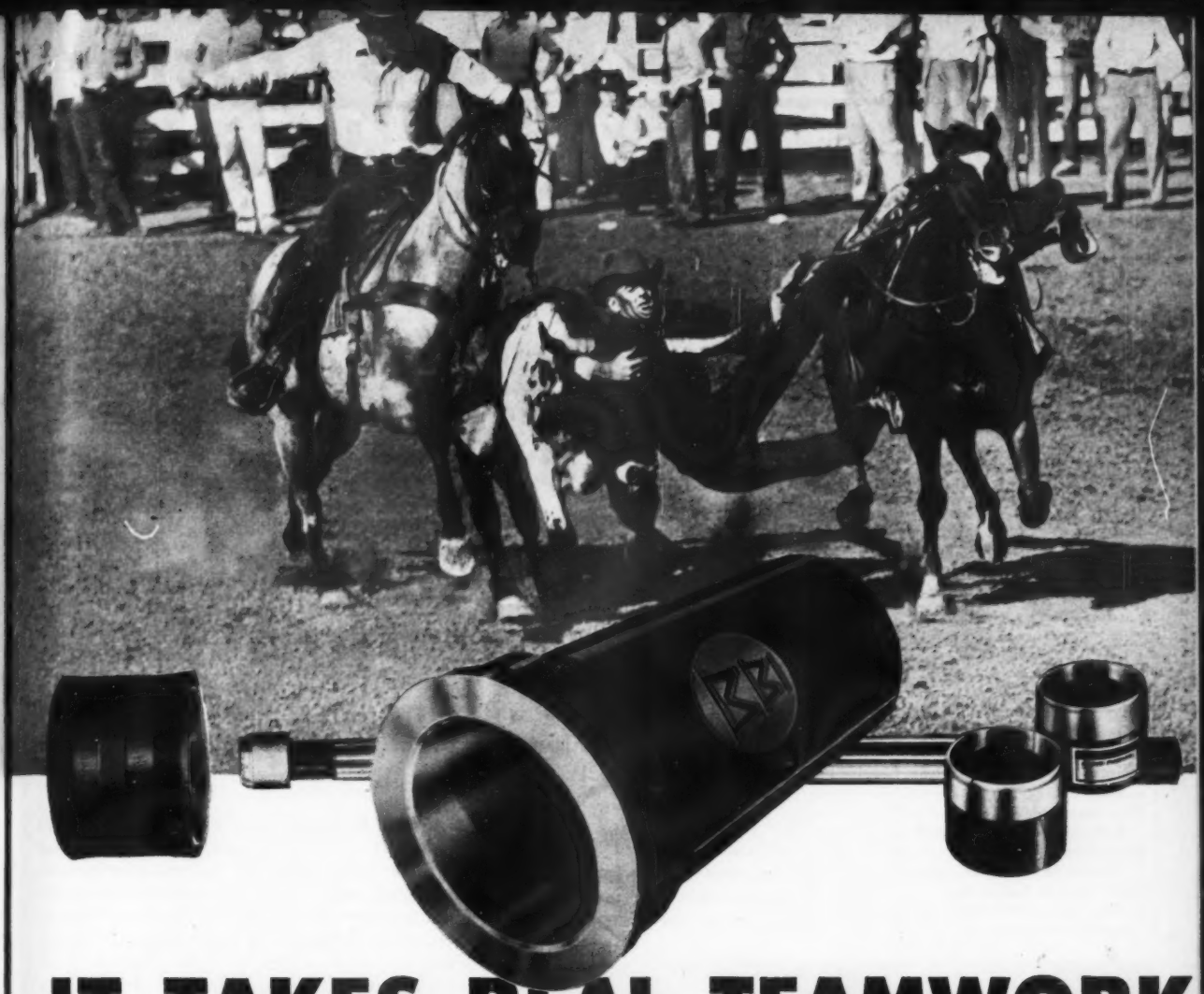
Fig. 12 shows a typical curve for separation of isobutane from normal butane. It will be noted that for a given product purity there is a definite pressure at which the column will have its maximum capacity. For a very high degree of separation the curve has a relatively sharp peak (as will be noted in the 98 per cent curve), which indicates that the optimum operating pressure must be very carefully selected. If the product composition is less critical, the optimum operating pressure also becomes less critical. The 80 per cent curve is rather flat at the top, indicating some leeway in the pressure range at which optimum capacity may be attained.

When pressure on the fractionation column is held above or below the optimum point, the feed rate must be reduced, which results in a decrease of product of the desired quality. In addition to the decreased capacity, the cost per gallon of product increases because the volume of reflux per gallon of feed must be increased, resulting in additional pumping, steam consumption, and cooling requirements.

Since there are a number of opposing factors to be considered in each fractionation system, it is impossible to give here the maximum capacity of a given column. Capacity of a fractionation column, which in most cases is limited by vapor volume, increases with an increase in pressure and the tray efficiency usually increases also with increased pressure. However, both of these factors are counteracted by the fact that relative volatility decreases as the pressure is increased.

The optimum capacity of a column can be determined rather easily if sufficient feed volume is available to run a test. Since the column will

(Continued on page 117)



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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Lead Burning

ALTHOUGH sulfuric acid treating is not as important relatively as in the past, nevertheless the actual consumption of sulfuric acid in petroleum refining continues at about the same level. Lead is the standard material for handling dilute acid, or acid that must be exposed to air (and its moisture). The lining of agitators, vessels, settlers, etc., has always been a difficult operation. Not only must the lead be supported at intervals of only a few inches, but every support must be completely covered with lead. The following discussion of welding or "burning" lead was taken primarily from Linde Tips of October 1950 (Linde Air Products Co.).

The important thing to remember in welding lead is that the heavy, soft, dull-gray metal melts quickly even under a small blowpipe flame. Large pieces of lead will even collapse under their own weight during welding if they are not supported properly. You have to be careful therefore not to use too much heat.

Proper ventilation is important so that you don't inhale any harmful fumes during welding. Work outdoors or in a well-ventilated place. If you must work in confined areas, use a blower to blow away the fumes.

TABLE 1—TIP AND ROD SIZES FOR WELDING LEAD

Sheet designation (lb.)	Sheet thickness (in.)	Welding-rod diam. (in.)	Diam. of flame port drill size
1	1/64	1/32	79
2	1/32	1/16	74
4	1/16	1/8	70
8	1/8	1/4	70
12	3/16	1/4	70
16	1/4	3/8	70
32	1/2	3/8	65
48	3/4	1/2	56
60	15/16	5/8	56

Preparing to Weld

Table 1 gives rod sizes, and will help you choose the proper tip size. Rod should be of the same type metal as the parts you are welding. For large jobs, homemade rod can be made by cutting strips from sheet lead. Always scrape the rod clean just before welding.

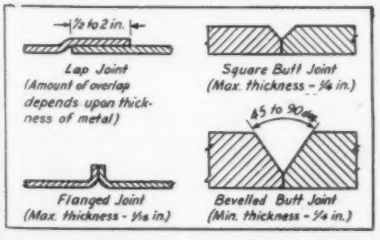

1/2 to 2 in.
Lap Joint
(Amount of overlap depends upon thickness of metal)
Square Butt Joint
(Max. thickness - 1/4 in.)
45 to 90 deg.
Flanged Joint
(Max. thickness - 1/16 in.)
Bevelled Butt Joint
(Min. thickness - 1/4 in.)

Fig. 1—The four types of joints used in lead welding.

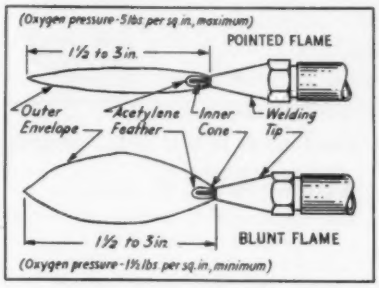


Fig. 2—The two types of flames. Refer to Table 1 for flame diameter. Use the pressures recommended by the blowpipe manufacturer.

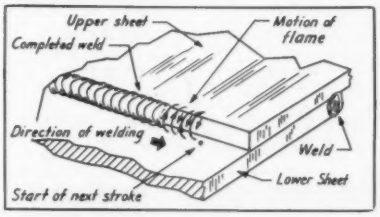


Fig. 3—Make lap welds by moving the flame in a series of short arcs toward the overlap, then straight away.

Fig. 4—This partially completed lap weld in vertical sheet shows how lead from the top sheet is melted down to form the weld.

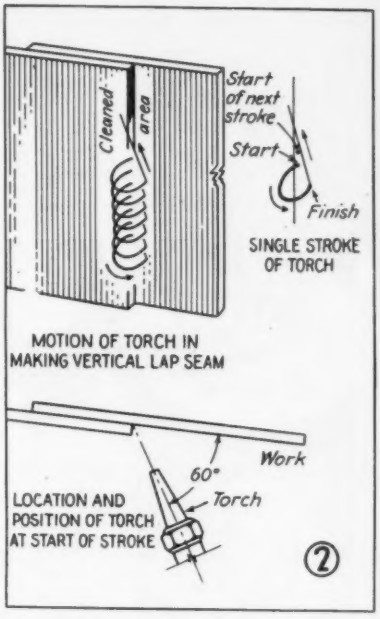


Fig. 5—In making vertical lap joint, move the flame in a series of small overlapping circles from the underneath sheet to lapped edge and back.

Some of the simple lead joints are shown in Fig. 1. Lap and flanged joints are made by bending the sheets. Use a knife to prepare butt joints. First cut the vee with a knife, then scrape the facing edges clean. Tap the sheets with a mallet for a close fit.

Making a Lap Joint

To make a lap joint in sheet ⅛ in. thick, first scrape the exposed edges and overlapping surface of both sheets. Then tap the joint with a wooden mallet to bring the sheets into close contact.

Use the welding tip recommended in Table 1, and set the regulators for the pressures recommended by the blowpipe manufacturer for lead welding. Adjust the blowpipe for the tiny,

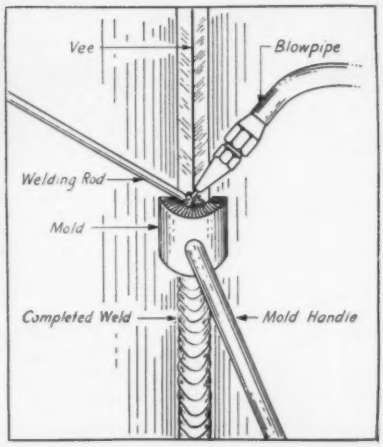
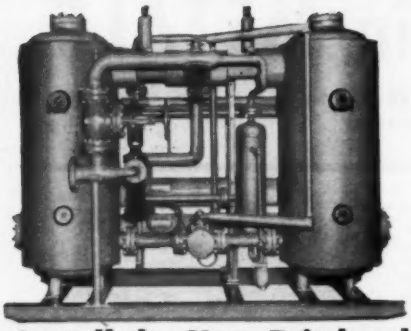


Fig. 6—An iron mold will help in making vertical butt welds.



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pointed neutral or slightly excess acetylene flame shown in Fig. 2.

After you get the proper flame, hold the blowpipe so that the flame is pointed straight at the surface of the work with the end of the inner cone almost touching the surface. Make the weld by moving the flame in a series of arcs toward the overlap and then straight away as shown in Fig. 3. Heat a spot on each sheet until a tiny puddle forms. Concentrate the flame a bit more on the lower sheet so that it will melt at the same time that the upper sheet melts. As soon as the puddle forms, fusing the two sheets together, lift the blowpipe away quickly. Melt a new spot, overlapping the first, the same way. The idea is to make a series of spot welds.

To make butt welds in lead sheet ½ in. thick, prepare the edges as shown in Fig. 1 by scraping with a knife, beveling, and tapping with the mallet. Next scrape the end of a ⅜-in. lead rod with the knife. Set the regulators as you did to make a lap joint and use the pointed flame.

Hold the blow-pipe flame at one end of the joint and place the end of the rod in the flame. A drop of metal from the rod should be added just as the edges of the nose of the butt joint melt together. Deposit a drop of rod at a time along the bottom of the vee. When you weld the other end of the joint, let the weld cool a little, then wire brush it.

Now adjust the blowpipe for the blunt flame shown in Fig. 2. Deposit another layer of weld metal right on top of the first layer. Melt the rod metal you deposited before and the beveled sides. Then add a drop of rod at a time until you reach the other end of the joint. Make as many more passes as needed until you fill the beveled area with rod metal.

Vertical lap joint.—Start welding at the bottom of vertical seams and work upward as shown in Fig. 4. If the lower end of the weld does not rest on another lead plate, use a small plate or rod to support the first drop of molten weld metal. When this drop hardens it will support the next overlapping drop.

First clean the areas of both overlapping surfaces. Move the blowpipe flame in a circular motion as shown in Fig. 5. The overlapping edge supplies weld metal that gives a rounded finish to the joint. Move the flame higher and repeat this process as soon as the first puddle solidifies.

Vertical butt joint. — Now practice making a vertical butt weld, in lead ½ in. thick, using an iron mold. Make the mold as shown in Fig. 6. First place the mold over the joint, then melt the beveled edges and welding rod so that they fuse together and fill the mold. Be sure that the lead in the bottom of the mold is in a molten state before you add more lead from the rod.

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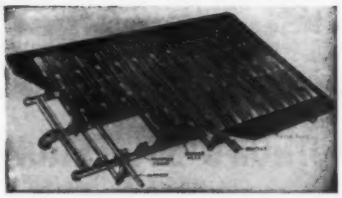

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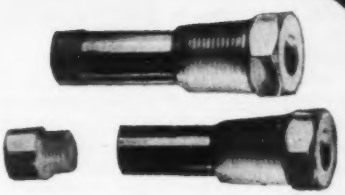

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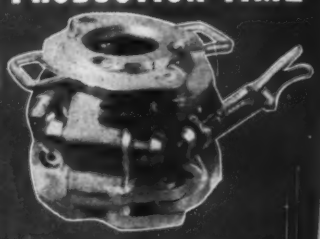

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XUM

Let's Improve and Simplify Our

by Max W. Ball

ISN'T it time that we took steps toward a better oil and gas lease form? I don't mean changing the provisions of the forms now in use; I mean improving their wording and the order and clarity of their presentation. Wouldn't a simpler form, more logical in its arrangement, be a blessing to the lease man, not to mention the landowner, if not to the lawyer? Wouldn't it help to improve lessor-lessee relationships and hence the general public relations of the oil producer?

Do you doubt that improvement is needed? Get out a copy of any of the Producers 88's now in use and study it as though you had never seen it before. See whether your reaction is not the same as mine.

Some time ago I was trying to draft an option to purchase underground gas storage rights, to be incorporated in the ordinary oil and gas lease form. I wanted the resulting instrument to be simple, clear, and comprehensible to the prospective lessor. I quickly rediscovered, as I and many others had discovered before, that the oil and gas lease form is no longer simple, clear, and comprehensible to the layman, or indeed to the lawyer not familiar with it. On the contrary, it is confusing and in some parts almost self-contradictory.

The form is clear to us because we know it, have lived with it, and have experienced its operation; we accept it as a good lease form because it works. But are we justified in continuing to use a form that is not simple or easy to understand by someone, lawyer or layman, who has not lived with it—a form, for example, in which the term clause is modified by later clauses in the fine print?

The various forms in general use have grown by accretion, with new clauses down in the ruck of general provisions that modify and even negate the important initial clauses, even so important a clause as the term of the lease. The best that can be said for them is that the courts have acquiesced in their use and that in consequence they serve their purpose as effective oil and gas leases. They do not, however, meet another important requirement, that of forming an instrument so clear that an intelligent landowner and his lawyer can understand it. Anyone not familiar with the lease must either consult an experienced oil lawyer or take the lease apart and reassemble its various provisions or accept the representations of the lease man, with whatever chance this may entail of a later claim that the terms were misrepresented.

I wonder whether the tendency of the courts to interpret every question against the lessee does not arise, in part at least, from a recognition by the judges that the lessor could not reasonably be expected fully to understand the instrument he has signed. I suspect that I should feel that way if I were on the bench.

The objection that will be raised against this or any other attempt to simplify the lease form is of course a cogent one: it abandons phraseology that has stood the test of court interpretation. If the courts are interested in practice rather than

HERE'S THE AUTHOR'S SUGGESTION FOR

In consideration of ..... Dollars ($.....), receipt of which is hereby acknowledged, ..., Lessor, hereby grants and conveys to ....., Lessee, its successors and assigns, the right to explore for, mine, produce, and operate with respect to oil, gas, and related substances[1] on and from the lands hereinafter described, together with the right to drill such wells and to install and operate such structures, fixtures, and equipment and to do such other things as may be necessary or incident to the exercise of the foregoing rights, said lands being situated in the Township of ....., County of ....., State of ....., and described as follows, containing ..... acres, more or less:[2]

Subject to the following terms and conditions:

Terms: The rights hereby granted and conveyed shall remain in force for a term of ..... (.....) years, and so long thereafter as oil or gas[3] is produced, or as drilling therefor is prosecuted, without a lapse of more than sixty (60) days between the cessation of production or the completion of a well and the commencement of operations for the drilling of another well.[4]

Royalty: Lessee will pay to Lessor as royalty one-eighth (⅛) of the market value of all oil, gas, and related substances[5] produced and saved[6] from said lands, computed at the price therefor prevailing at the time of production at the pipe line or plant or storage tanks to which Lessee may connect it wells,[7,8] or, at Lessor's option, will deliver to Lessor's credit, free of cost in the pipe line or plant or storage tanks to which Lessee may connect its wells, one-eighth of all oil, gas, and related substances produced and saved from said lands.[9] Cash payments of royalty hereunder will be made monthly during the month following production unless the amount due Lessor or any royalty owner claiming under him is less than Ten Dollars ($10), in which case payment to Lessor or such royalty owner will be made during the month following the month in which the amount due him becomes Ten Dollars ($10) or more.[10]

Offset Royalty: Lessee will drill all offset wells on said lands as required by law or custom, or in lieu thereof will pay the Lessor a royalty equal to one-eighth (⅛) of the market value of the production from each direct offset well on adjoining premises until Lessee commences the required offset well thereto.

Obligation to Drill or Pay Rental:[11] Lessee will commence operations for the drilling of a well on said lands within ..... of the date hereof, and, except while oil or gas is being produced and during sixty (60) days thereafter, will continue operations for the drilling of a well or wells without a lapse of more than sixty (60) days between the completion of a well and the commencement of operations for drilling another, failing which this lease shall terminate as to both parties unless Lessee shall pay to Lessor in lieu thereof, in advance, a rental of ..... Dollars ($.....) for each ..... that such operations are deferred or suspended. Such rental shall be considered paid if made or tendered in person or by mail in currency, draft, or check to Lessor or to his account in the ..... Bank at ....., or its successors, which bank or its successors shall remain the depository regardless of changes in ownership of said lands. No such payment of rental will extend the lease beyond the term above provided.

Injection Rental: If water not produced on said lands is injected into the subsurface strata of said lands as provided below, Lessee will pay Lessor Twenty-five Dollars ($25) per year for each well into which such injection is made.

Free Gas: Lessor shall have the right, free of charge, by making his

Footnotes—Explanatory Discussion

1. The usual wording "oil, gas, casing-head gas, and casing-head gasoline" is cumbersome; moreover, it misses condensate as well as gasoline from gas from a gas well, which is "natural gasoline" but not, strictly speaking, "casing-head gasoline."

   Query: Would it be safe to say merely "oil and gas," trusting the courts to know that condensate and natural gasoline are forms of oil and gas?

2. Have omitted the clause in some forms that attempts to cover adjoining lands or interests owned by Lessor. If I were in Lessor's place I'd not agree to it.

3. No need to refer to "related substances" here; there is no known way to produce condensate or natural gasoline or any other "related substance" without producing gas or oil.

4. Is there anything against making this provision for nontermination during drilling a part of the term clause instead of a separate clause later in the lease? It seems to me to be an extension of the term in the same sense that production is, and to belong in the term clause.

5. Is there any reason, other than historical, for making a distinction between oil royalty and gas royalty, or paying "⅛ of the gross proceeds" instead of ⅛ of the market value for casing-head gas, or providing for an annual fixed rental instead of a royalty on a well producing unmarketed gas?

6. Isn't gas used to make condensate

Oil and Gas Lease Form

"In the hope that some such thing may happen, and lead eventually to a better form, I expose my draft and invoke the legal lightning on it!"

A SIMPLER OIL AND GAS LEASE FORM

own connections at his own risk, to gas from any gas well on the premises, or any gas well in a pooled unit that includes all or any part of the premises, for all stoves and inside lights in the principal dwelling house on the land covered by this lease.

Protection of Lessor: Lessee will pay for all damages caused by its operations to Lessor's growing crops, trees, or improvements on said land, and will adequately protect Lessor's fresh water supply from contamination or injury as a result of its operations, and when so represented by Lessor will bury any pipe line below plow depth, and will not without Lessor's consent drill a well within 200 ft. of any house or barn now on said lands.

Water Injection: Lessee may inject water into the subsurface strata of said lands, below those furnishing Lessor's fresh water supply, whether such water is produced on said lands or on other lands, without restriction as to quantity or mineral content.

Communitization: Lessee may pool or communitize all or any part or parts of said lands with other lands to comprise one or more development units of not more than ..... acres each, and drilling operations or production on any such unit shall constitute compliance herewith to the same extent as though such operations or production were on the lands hereby leased. Lessor shall participate in the royalty from any such unit in the proportion that the number of acres owned by him within the unit bears to the total number of acres therein. Lessee shall at all times keep Lessor informed of the lands embraced in any unit of which the lands hereby leased form a part.

Lessee's Use of Oil, Gas, and Water: Lessee shall have the right to use, free of royalty or cost, gas, oil, and water produced on said lands for all operations thereon, except water from wells of Lessor.

Right of Surrender:[12] Lessee may surrender this lease as to any part or all of said lands by delivering or mailing to Lessor or recording in the appropriate county a release of the lands so surrendered, whereupon all rights and obligations of both parties hereunder shall be at an end as to the lands so released except for payments theretofore due from one party to the other.

Partial Ownership: If Lessor owns a less interest than the entire and undivided fee simple estate in said lands, the payments provided herein shall be made to Lessor only in the proportion which his interest bears to the whole and undivided fee.

Assignment: The estate of either party hereunder may be assigned in whole or in part, and the covenants hereof shall extend to the heirs, executors, administrators, successors, and assigns of the assignor, but no assignment by Lessor shall be binding on Lessee until Lessee has been furnished a written assignment or transfer or a certified copy thereof, and no default by an assignee to whom Lessee has assigned a part of the leasehold shall affect the rights of Lessee with respect to the lands not included in such assignment.

Laws and Regulations to Govern: This lease is subject to all Federal and State laws, rules, and regulations now or hereafter in effect, and neither party shall be held in default because of compliance therewith.

Warranty: Lessor hereby warrants and agrees to defend the title to said lands and agrees that Lessee shall have the right at any time to pay or redeem for Lessor any mortgages, taxes, or other liens thereon, in the event of default of payment by Lessor, and be subrogated to the rights of the holder thereof.

Witnesses:

..... (Seal)

..... (Seal)

..... (Seal)

---

or natural gasoline covered by "produced and saved" without adding "or used in the manufacture of natural gasoline, condensate, or related substances?"

7. Could this clause "computed . . . . wells" not be omitted, on the basis that "market value," with the numerous decisions as to its meaning, sufficiently defines the price to be paid?

8. Isn't the well head the payoff point, in practice, instead of the pipe line or gasoline plant or storage tank? If so, the words "at the well head" could be inserted after "market value," and there would be still less reason for the clause 'computed . . . . wells."

9. Is there any reason, other than historical, why the lease should provide for oil royalty in kind? If there is, shouldn't the payment-in-cash provision, which is in practically universal use, be put first instead of the payment-in-kind provision that is so seldom used?

10. Is there any objection to putting this provision for deferred small payments in the royalty clause instead of down among the miscellaneous provisions, and if not, does this wording cover it?

11. This may look revolutionary, but all I have done is to bring together the state positively instead of negatively the varied scattered obligations to drill. It seems to me that this positive presentation will appeal more to the Lessor, and impose nothing additional on the Lessee.

12. Have the decisions made a surrender clause unnecessary?

THE AUTHOR

The author, oil and gas consultant of Washington, D. C., has been very active in the oil industry and the author of numerous technical papers and reports. He has served as chairman of the Oil Board of the U. S. Geological Survey, engineer with the U. S. Bureau of Mines, manager of exploration in the Rocky Mountain area for the Shell companies, was president of Argo Oil Co., and during the war was special assistant to PAW. Previous to his return to consulting work in 1948, he was director of the Oil and Gas Division in the U. S. Department of the Interior.

phraseology, however, as I believe they are, the objection loses much of its force if the new instrument makes no material change in the operation of the contract, whatever change it may make in wording. If this reasoning is correct, a new and simpler statement of prevailing provisions should be received with favor by the courts.

On the chance that this reasoning is correct, and that if someone should start a discussion something might be done about the matter, I have attempted to draft a simpler, more coherent, and more logical form. The result appears below. It is full of doubts and questions, the more important of which I have footnoted.

I have not tried to attain simplicity by omission. I have tried instead to cover everything that is covered by forms in general use. I have, for example, included communitization, water-injection, and offset royalty clauses. I have omitted the gas-storage option, of increasing importance in most parts of the country, not because it is not simple but because I don't want to distract attention by inserting something relatively new.

I am not so foolish as to think that oil-company lawyers, of their own motion, will give the matter much consideration. They are more likely to say, "Why bother? We have a lease form that works, that is sanctified by years of use, and that has behind it volumes of judicial interpretation. Let it and us alone."

The limit of my hope is that a few land and lease men and their department heads—men who bear the burden of dealing with the landowner and his lawyer—will say to their lawyers: "Look. If you can give us a simpler and more logically arranged lease form, one that we can more easily explain to a prospective lessor, we want it."

In the hope that some such thing may happen, and lead eventually to a better lease form, I expose my draft and invoke the legal lightning on it.

XUM

CORROSION and its control

How to Locate "Hot Spots"

A BARE pipe line will always be found to corrode much more rapidly in certain sections than in others. Since it is rarely economical to attempt the complete cathodic protection of a totally bare line, it becomes necessary to locate the "hot spots" in order to place the protection where it is most needed. Properly distributed hot-spot protection may be expected to prevent up to 90 per cent of the leaks, at a cost of perhaps 15 per cent of that of complete protection.

It might reasonably be expected that a chemical study of the various soils traversed by the line would give us the information sought. However, such is not the case for two reasons: (1) the soil varies tremendously in its chemical composition; there may be literally hundreds of significant differences within a few feet; (2) the differences themselves, sometimes within inches, have more effect on the corrosive attack of the soil than the simple chemical composition. What is needed is some characteristic which correlates very closely with corrosiveness, and at the same time may be measured rapidly and easily.

Of course, the most positive indication of a hot spot is a leak in the line. This method of locating them is not recommended as a general practice; however, there is no point in ignoring evidence already collected unwillingly; we may therefore list with confidence every recorded (or remembered; records may not have been kept) leak site as a hot spot.

Corrosion is an electrochemical phenomenon; if the chemical approach is too complex to be practical, such is not the case with the electrical. It has been established that there exists a very close correlation between corrosiveness in soil and the electrical resistivity, and this easily measurable quantity will serve to locate the hot spots before the leaks make them obvious.

The unit of resistivity is the ohm-centimeter (ohm-cm.) which is equal to the resistance in ohms of 1-cm. cube of the material in question, measured between two opposite parallel faces. A certain clay might have a resistivity of 100 ohm-cm. Then the resistance of a 2-cm. cube of this same clay would be 50 ohms, because, although the length of the current path is twice as great, the cross-sectional area is four times as great. This relationship shows that it is incorrect to use "ohms per cubic centimeter" as the unit of resistivity, since the resistance is not proportional to the volume.

There are a variety of instruments for the measurement of soil resistivity in place. For the purposes of a survey such as we are considering, the most commonly used instrument is a single-rod apparatus, consisting of a steel rod with a metal tip insulated from the rod proper, and a small battery-powered alternating-current bridge, using a pair of headphones to indicate balance. The resistance of the soil in the vicinity of the rod tip is compared with an adjustable resistance in the instrument, and the resulting reading, multiplied by the "rod constant," gives the resistivity directly in ohm-cm.

In making a survey, readings are taken near pipe depth, and at intervals ranging from as little as 10 ft. up to 400 ft., it is important to catch all the significant changes, and visual inspection will usually insure against passing any. If an unexpected reading is obtained, it is occasionally necessary to back up to locate the spot where the change occurred. From 5 to 10 miles per day can be covered in this manner by two men.

The values thus determined are plotted on semilogarithmic paper as a resistivity profile of the line. The

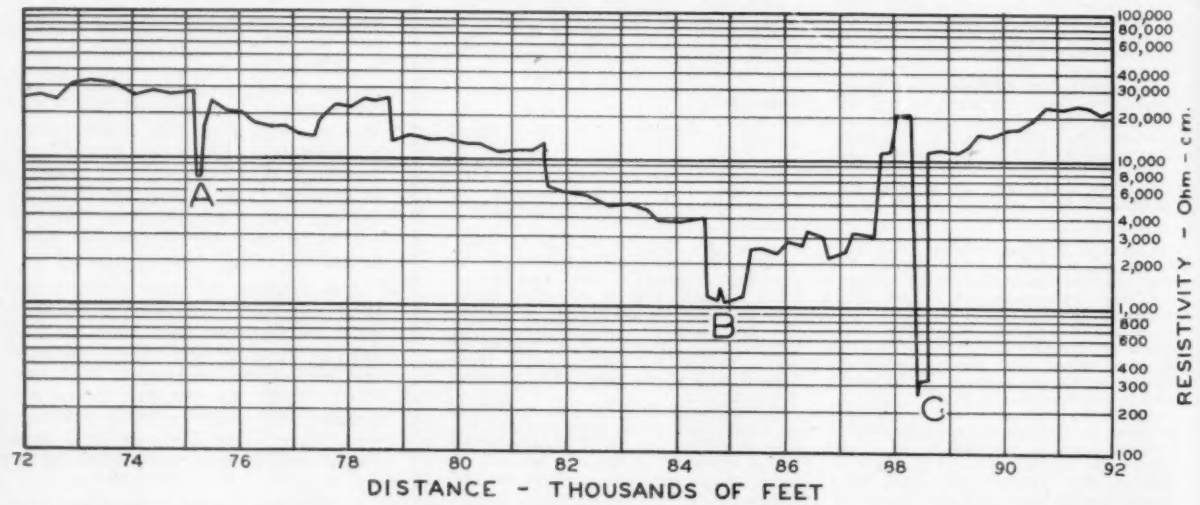

Fig. 1—Soil resistivity profile, showing location of three hot spots: (A) a stream crossing where the pipe dips down into a clay stratum: (B) a marshy creek bottom: (C) a severely corrosivg stream crossing with some salt contamination.

Part 2 of a series by Marshall E. Parker, consulting engineer, Houston.

logarithmic scale is needed for the resistivity because it is the percentage comparisons which are important. From this profile the hot spots may then be located, using the following rules for guidance:

1. Values below 1,000 ohm-cm. are almost always corrosive, except when they are relatively short isolated sections lying between areas of still lower values, or when they comprise the highest values in a long section of line.

2. Values above 10,000 ohm-cm. are almost never corrosive; very rarely a short section of such soil will be somewhat corrosive when the sections on either side have much higher values, but even then the corrosiveness is relatively mild.

3. Values between 1,000 and 10,000 must be interpreted by comparison with the immediately adjacent sections; relatively low areas will tend to be corrosive sections if there are any present.

The accuracy with which hot spots will be located depends upon the accuracy with which the selected readings are taken at truly representative samples of the pipe's environment. One type of severely corrosive area will not be discovered by such a survey; that is one in which the pipe is buried in soil contaminated with cinders, or other foreign particles of inherently low resistivity. The corroding cells formed in such an environment are of such small dimensions that all of the survey methods in common use may fail to detect them.

Recovery and Retention of Light Hydrocarbons

(Continued from page 108)

undoubtedly be upset during a portion of the test, it should be run when off-specification product can be tolerated. At a predetermined pressure and feed rate, the reflux rate should be changed and analyses of the product made at several rates. Then, the feed rate should be changed and the test repeated at several different feed rates. The rate giving the desired recovery should be plotted against the pressure. By this method several pressure points can be charted and the optimum fractionator capacity may be determined. Such tests must be carefully planned to reduce off-specification production to a minimum.

The data obtained from the above test will show a maximum capacity for each column pressure and will show a different optimum capacity for each individual separation. Needless to say, the more components in the feed product the more complex will be the problem to determine the optimum column capacity.

Conclusion

Some of the basic principles involved in the extraction of natural gasoline from natural gas have now been considered. The heavier products are usually in great demand as a blending product for motor fuel and aviation products. The market for light hydrocarbons still fluctuates considerably from summer to winter, whereas the production capacity stays almost constant. For these reasons, L.P.G. product is still being left in the residue stream of some plants in the summer time. This reduced production is necessary because summer markets have not been developed to consume all the products which can be produced with the equipment designed to satisfy the winter market.

To date it has not been practical or profitable to provide steel pressure storage to take care of the seasonal differences in production and demands. A number of companies have tried underground storage with varying degrees of success. Where tight underground reservoirs are not available very little of the product is recovered and the storage region merely becomes a place for disposing the surplus product.

References

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3. Natural Gasoline Supply Men's Association, Technical Manual (Fifth Edition, 1946).

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ENGINEERING fundamentals
No. 435

Linear-Flow Saturation Gradients

A METHOD for computing water-saturation gradients for steady-state linear flow was outlined in Engineering Fundamentals No. 432. Briefly, it is found from graphically integrating the following expression:

$$\int \frac{k_o/\mu_o \; dp_c/dS_w}{q_w\,[1+(k_o/k_w)\,(\mu_w/\mu_o)] - q_t}\, dS_w = \int dl \qquad (1)$$

Certain characteristics of the distributions calculated from this expression are worth noting, for which reason Fig. 1 shows a family of curves calculated for $q_t = 1.0$ cc. per second per sq. cm. and various values of q_w. Each of these curves gives its corresponding water saturation gradient with distance as in Fig. 2 (found by integrating under the curves of Fig. 1).

It is first worthy of note that the distance limits over which the saturation will vary increase as the relative amount of water flow decreases, even for a given total flow. Thus, Curve 1 in Fig. 2 requires a greater distance from the reference to reach constancy than does Curve 5.

From the character of Equation 1 it is noted that any change in q_t changes the value of the left-hand integral expression by the reciprocal of the change of q_t provided the ratio q_w/q_t is kept constant. Thus, the curves of Fig. 1 could also apply to any total rate by dividing the y axis by that rate, the q_w values then being equivalent to q_w/q_t ratios. A change in q_t would change the distance axis on Fig. 2 by a corresponding reciprocal amount. For example, a change in q_t from 1.0 to 0.10 would increase the integral values by 10 (y axis of Fig. 1) and the distance axis on Fig. 2 by 10.

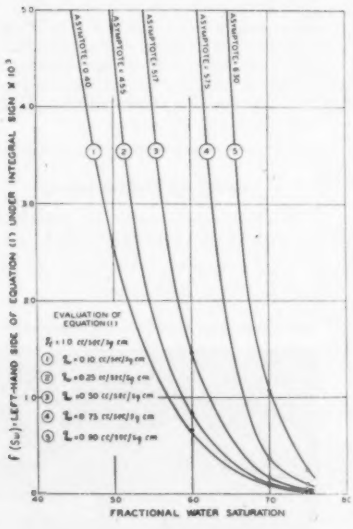

ASYMPTOTE = 0.830
ASYMPTOTE = 0.875
ASYMPTOTE = 0.917
ASYMPTOTE = 0.955
ASYMPTOTE = 0.980
EVALUATION OF EQUATION (1)
q_t = 1.0 cc/sec/sq cm
① q_t = 0.10 cc/sec/sq cm
② q_t = 0.25 cc/sec/sq cm
③ q_t = 0.50 cc/sec/sq cm
④ q_t = 0.75 cc/sec/sq cm
⑤ q_t = 0.90 cc/sec/sq cm
$\int (S_w)$-LEFT-HAND SIDE OF EQUATION (1) UNDER INTEGRAL SIGN X 10^3
FRACTIONAL WATER SATURATION

Fig. 1

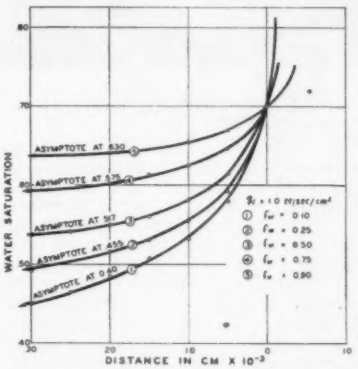


Fig. 2—Distance vs. water saturation for various fractional water-flow values.

This change emphasizes the fact that lower total rates of flow or what is equivalent, lower pressure gradients, tend to spread out saturation gradients. Applied to relative-permeability measurements, the saturation within the system departs more from a constant value at low total rates of flow and low fractions of water flow. This, of course, is for a water-wet system. For a value of $q_t = 0.001$ cc. per second per sq. cm. and $f_w = 0.10$, the saturation spread could be quite marked.

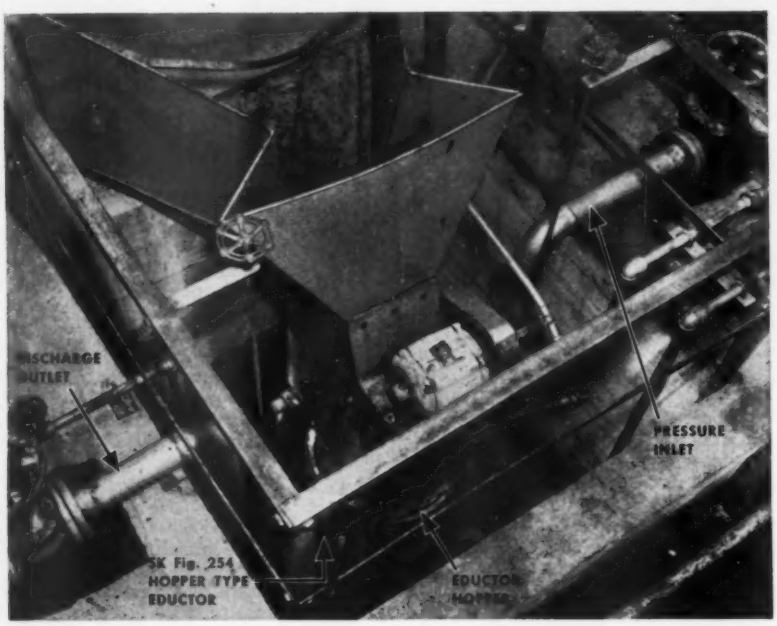
It is pertinent to inquire whether the distances involved would be of importance in field work. Examination of the integral of Equation 1 shows that the integral value increases directly as dp_c/dS_w. In the particular case chosen dp_c/dS_w values are fairly low (see Engineering Fundamentals No. 432). For lower-permeability sands the relative-permeability character might remain essentially unchanged from that used here, but the capillary-pressure values could increase markedly. However, the integral value of Equation 1 also varies with the absolute permeability in the opposite direction so that lower values of permeability give smaller integral values. It would be an individual matter whether the decrease in absolute permeability compensated for the increase in dp_c/dS_w, the latter depending more upon the pore character than upon the absolute permeability. For lower-permeability sands, rates would also be lower. For example, the rate of 1.0 cc. per second per sq. cm. is equivalent to 505 bbl. per day per sq. ft. For low permeabilities this would be an extremely high value of throughput. The distances in Fig. 2 would increase with low permeabilities because of this factor.

Although there could be some cases where rates of production were low and pore geometry quite varied, it is expected that the distances involved for field situations would be only of the order of centimeters or less.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, Penn State College

XUM

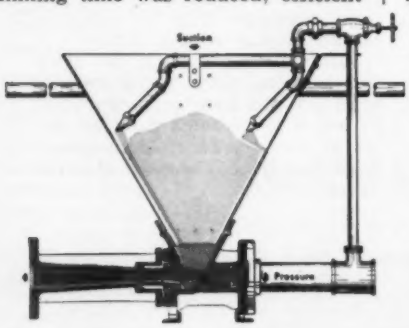
Esso Standard Oil Co. Uses SK Eductor to Outmode Hand Mixing



In the manufacture of certain chemicals made from petroleum derivatives, the Bayway Refinery of Esso Standard Oil Company at Linden, N. J., found it necessary to add and mix large quantities of granular dry solids in a liquid stream.

Prior to installation of an SK Fig. 254 Hopper Type Eductor, illustrated, this mixing was done by hand. Economies of the new method were immediate and gratifying: labor for mixing was eliminated; mixing time was reduced; efficient mixing was obtained; and area appearance was improved.

The 3" Eductor, shown in the photo and in detail in the drawing, is located in a concrete pit. Liquid is pumped from a feed tank by means of a centrifugal pump through the eductor and back into the feed tank. During this liquid re-circulation, granular dry solids are added to the stream until proper ratio is obtained, at which time the liquid is pumped from the feed tank directly into the storage tank, by-passing the eductor.



The Bayway Refinery has mounted a rotary crushing machine atop the eductor hopper for the purpose of crushing large particles into sizes suitable for feeding into the hopper of the eductor and from there into the eductor chamber. The installation handles 72 lbs. per minute of solids with 100 gpm of liquid at 50 psi gauge, maintaining a 20 ft. head at discharge.

For details on all types and sizes of SK Eductors, request Bulletin 2-M.

SK FLOW INDICATORS PROTECT DEEP HOLE DRILLS

Diamond-studded drilling bits worth several thousand dollars each can be burnt out in a matter of minutes if coolant water clogs. SK Rotary Flow Indicators, pictured, are being used by prospecting companies to avoid this.

They permit visual indication of flow in the tool coolant pipeline, and show at once any clogging of the water line to the cutting tool head. One prospecting company in Missouri drills prospect holes 6" in diameter and up to 1200' deep.

The Indicator, made of bronze or cast iron, contains a plastic rotor whose rotating motion is observed through sight glasses on either side. Sizes range from ½" to 2" inclusive, *and are available from stock.* Request data.

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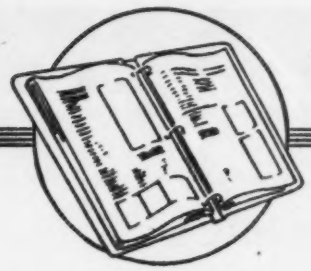
Manufacturing Engineers



THE REFINER'S notebook

No. 59

How Grease Lubricates*—1

IT was brought out previously that when relatively minor percentages of certain metallic soaps are mixed with a petroleum oil a material that has a semisolid, plastic, fibrous physical structure is produced. This structure was visualized as being due to a lattice-like arrangement of fibers of soap throughout the mixture. The fibrous soap lattice was shown to be present in all greases, even though the individual soap fibers may be so short and so small that the grease appears and feels as smooth as butter. This soap lattice serves to entrap and "fence in" the oil. But added to this there appears to be a force, similar to capillarity, which holds the hydrocarbon oil molecules in the soap lattice. This entrapment and holding by the soap lattice is so effective that the oil can be "squeezed" out of the mixture only with the greatest difficulty.

Furthermore, we have assumed on theoretical grounds that a comparatively minute percentage of the polar soap molecules are "loose" in the mixture. These may be visualized as being attracted to the metal bearing surfaces by the electrical "polar" forces. This action could contribute to the formation of a thin layer or film of grease that adheres strongly to the bearing surfaces, and is very difficult to dislodge.

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."

Fig. 4—That part of the grease beyond the metal's electrical field is made up of a three-dimensional, lattice-like structure of soap fibers, which entraps and holds the oil within this structure much like a pile of entwined twigs will hold wet leaves. The soap fibers are composed of elongated bunches of soap molecules.

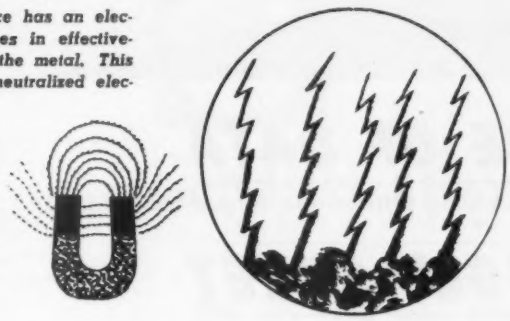


Fig. 1—Any metal surface has an electrical field that diminishes in effectiveness with distance from the metal. This field is the result of unneutralized electrical charges in the surface layer of metal atoms. Each of these countless charges can be visualized as a tiny magnet capable of exerting a pulling force on any body that has an opposite electrical charge.

From the foregoing facts we can readily understand how the soap and oil in a lubricating grease combine in providing a material that can remain in a bearing under conditions that would tend to force a fluid lubricant out. But the reader may well wonder, at this point, how a relatively nonfluid, plastic material like grease can supply the fluid type of lubrication so necessary in overcoming or lessening friction. In other words, how can such a material flow? This question will be answered in installments to follow.

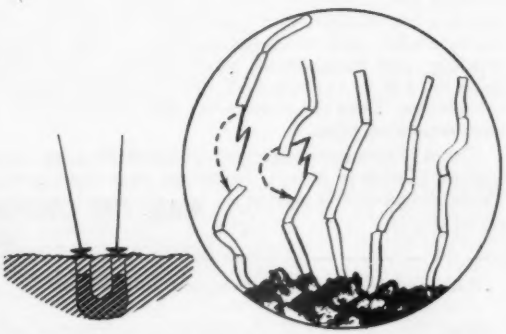


Fig. 2—The polar molecules of metallic soap used in making a grease are "electrically unbalanced," as explained in an earlier chapter. This electrical unbalance may be thought of as giving the molecules electrically active "ends." The electrical field of a metal surface attracts these electrically active soap molecules much as a magnet attracts small nails.

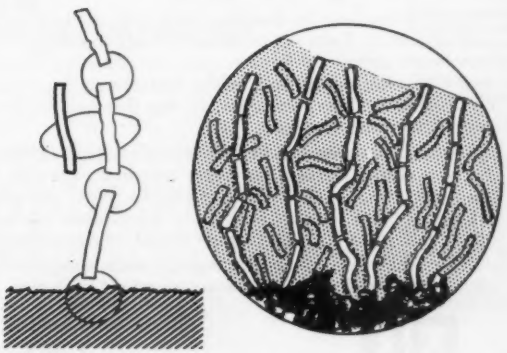


Fig. 3—The effectiveness of the electrical field existing at a metal surface extends out for a distance that is equal to several molecule lengths. Thus some of the polar soap molecules can be assumed to line up more or less end-to-end, as illustrated. At the same time these polar molecules attract and hold in place oil molecules which are similar, thus forming a lubricating film.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 AN ENGINEERING ACHIEVEMENT. This comprehensive, 18-page book in color shows every detail of the new and improved Model "W" electric pallet truck. A compact, powerful, pallet-type unit specially engineered to handle loads weighing up to 4,000 lb. *Towmotor Corp.*

2 BULLETIN NO. 894. The new, larger, engine-mounted hydraulic Baker bulldozers, grade-builders, and root rippers manufactured to match the new line of Allis-Chalmers HD-20, HD-15, HD-9, and HD-5 tractors are described in Engineering Bulletin No. 894. *The Baker Manufacturing Co.*

3 STOCKHAM VALVE CATALOG 50V. This concise new catalog has been planned for quick, easy reference. Listings are complete for the valves shown on each page and include photographs, dimensional diagrams, price, weight, sizes, and dimensions. *Stockham Valves & Fittings.*

4 COM-PLUS IS OIL PLUS ADDITIVES PLUS EXPERIENCE contains vital data on oil additives of the inhibitor and detergent-inhibitor types. Data tables index product, viscosity rating, type of crude, manufacturing process, and recommended uses. *Commerce Oil Corp.*

5 CHEMICAL FEED SYSTEMS is a reprint from proceedings of the tenth annual water conference of Engineers Society of Western Pennsylvania. Includes 20 illustrations of systems and equipment. *%Proportioneers, Inc.%*

6 AMPCO ALLOYS FOR PROCESS INDUSTRIES. Bulletin PI-2 covers the characteristics of Ampco alloys. The bulletin particularly stresses corrosion resistance, high strength, and design economy. *Ampco Metal, Inc.*

7 ARCON TROPICAL STRUCTURES includes engineering data and detailed drawings of truss, under roof, heights, window and door units, packaging and shipping components, and erection instructions on field buildings. Also included are plans for residences, office buildings, and storage buildings. *Taylor Woodrow (Building Exports) Ltd.*

8 CURTIS UNIVERSAL JOINTS is a 1951 catalog covering an extensive line of universal joints. Booklet is designed for use by designers, engineers, and maintenance men. *Curtis Universal Joint Co., Inc.*

9 WELDED PRESSURE VESSELS, a 16-page, 2-color booklet, perforated for binding, illustrates fabricating details employed in building welded vessels for pressure storage. *American Car & Foundry Co.*

10 HAYNES ALLOYS FOR HIGH-TEMPERATURE SERVICE summarizes all available data on 10 superalloys. Besides physical and mechanical properties of two newly developed alloys, the booklet now includes additional data on all 10 alloys. *Haynes Stellite Division, Union Carbide & Carbon Corp.*

11 NEW D.C. LIFE-LINE MOTORS AND GENERATORS, a 19-page

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Feb. 15, 1951

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booklet describing the new Life-Line type SK d.c. motors and generators. It shows how the new design uses rolled-steel frames, heavy steel brackets, steel angle feet, and prelubricated double-sealed ball bearings to provide added strength and long life without outages. *Westinghouse Electric Corp.*

12 CATALOG NO. 51 lists complete information on rotary drilling and truck tools. Catalog also lists data on the LeBus drop-forge plant and includes a directory of sales representatives and service installation shops. *LeBus Rotary Tool Works.*

13 PERMETER. An up-to-date report on services offered plus a brief history of the company is included in a new 12-page multicolored booklet. Acidization of wells through use of the "Permeter" is discussed. Latest types of equipment used in acidizing process are discussed in detail. *Chemical Process Co., Independent-Eastern Torpedo Co.*

14 CHEMONITE WOOD PRESERVATIVE. Descriptive 12-page booklet in 2 colors traces history of the development of this copper-arsenic preservative; gives facts and figures to show the efficiency of the wood-treating compound, and indicates the correct uses for Chemonite-treated forest products. *J. H. Baxter & Co.*

15 STRATA-SEAL, a new two color, four-page folder describing Strata-Seal, a light-weight additive to combat and prevent lost circulation of drilling mud. The folder gives six reasons why Strata-Seal will be preferred as a lost-circulation material. Two examples showing actual savings through the use of Strata-Seal are listed. Several actual Strata-Seal well histories are also included. *Strata-Crete Sales, Great Lakes Carbon Corp.*

16 THREE-ELEMENT AIR-OPERATED FEED WATER CONTROL. A new 16-page bulletin contains a straightforward, concise discussion of problems encountered in feed-water control and explains how the air-operated three-element system helps solve them. Diagrams, cutaway views, typical chart records, and photographs of modern installations are used liberally. *Bailey Meter Co.*

17 MONO-WELD RADIATORS. The four-page, two-color piece shows the design features and accessories for both the one-piece and sectional-type cores. One-piece Mono-Weld radiators are available in various sizes capable of dissipating from 70,000 to 800,000 B.t.u. per hour under standard conditions. *Young Radiator Co.*

18 PACKINGS AND PISTON RINGS FOR INDUSTRIAL SERVICE. The format of the 40-page book is a comprehensive study of applications for all types of packings and piston rings. Special attention is given to new developments in Carbon-Bakelite process and vital subjects such as chrome-plated piston rings and the new teflon piston rings. *France Packing Co.*

19 HD-9 AND HD-15 are two attractive 16-page catalogs. One describes the model HD-9, weighing 18,500 lb. and developing 70 drawbar horsepower. The other covers the model HD-15, weighing 27,500 lb. and developing 102 hp. at the drawbar. *Allis-Chalmers Tractor Division.*

20 INSTRUMENTS ACCELERATE RESEARCH. The acceleration of research through the use of industrial and related instruments and apparatus is the subject of this 84-page book. The book describes many types of equipment which, alone or in combination with other apparatus, are being used in research and analytical studies. *Brown Instruments Division, Minneapolis-Honeywell Regulator Co.*

21 WATER AND LIQUID LEVEL GAGES. A new 24-page bulletin, No. L700, describes instruments for measuring and recording water depth in reservoirs, elevated tanks, rivers, lakes, irrigation systems, process storage tanks, forebay and tail races, flumes, and weirs. *The Bristol Co.*

22 PRECIPITATING SOFTENER AND COAGULATOR. A new bulletin W-212-B6 describing the Type CM precipitating softener and coagulator, in which energy for floc preparation is mechanical, describes the Worthington hydraulically motivated system and the elementary chemical theory of softening. Also describes the flow circuit, diagrams the flow, and answers nine questions in a system appraisal. *Worthington Pump & Machinery Corp.*

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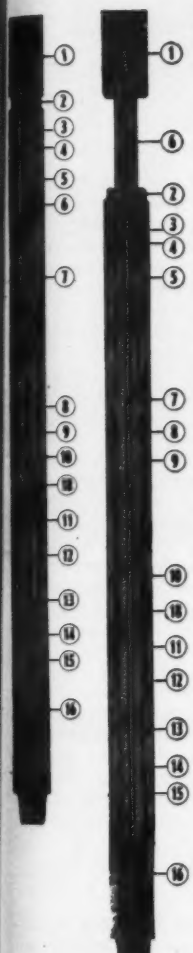
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller



Hydraulic Jar: left, set position, and right, striking position.

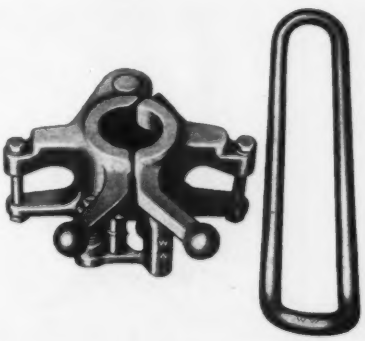
23 JOHNSTON-SUTLIFF HYDRAULIC JAR is operated hydraulically by means of lubricating oil which fills completely the annular space between the mandrel and the outer housing, thereby eliminating mechanical tripping. The hydraulic jar delivers a continuous series of blows over any necessary period of time with the simplest manipulation at the surface. The jar itself requires no rotation for its operation but, being adequately keyed against rotation of the mandrel within the housing, it provides for the rotation of any equipment below when such rotation is necessary for operation of the equipment or for backing off to right or left below the jar. In addition to being particularly adaptable for use with the Johnston Formation Tester, this jar is equally effective for fishing jobs, being run in the fishing string in the same manner as any other jar. It is operated by raising and lowering the string. Parts are: (1) top sub, (2) upper packing nut, (3) upper packing, (4) packing support ring, (5) key sub, (6) upper mandrel, (7) valve housing, (8) valve spring, (9) piston valve, (10) pipe plug, (11) lower mandrel, (12) seal ring, (13) lower packing sub, (14) lower packing, (15) lower packing nut, and (16) bottom sub. *M. O. Johnston Oil Field Service Corp.*

IT'S NEW CHECK IT

24 NEW METHOD OF REMOVING EXCHANGER BUNDLES results in lower initial investment for supporting structures in processing plants. Special exchanger jack has been designed for exchangers supported above the ground, by eliminating conventional pulling beams and their related structures. This improved bundle remover may permit a more compact general plant layout. Furthermore, exchanger supports themselves may be made somewhat lighter since they need not be designed to resist the stress of conventional bundle removing arrangements. The tube-bundle removing device is portable and consists of a modified commercial center-hole hydraulic puller. It has an extensible, jointed ram and an adjustable yoke to transmit force against the bonnet and shell flanges of exchangers of various sizes. The device can exert a push on the tube bundle up to 12,000 lb. for a maximum distance of 16 ft., permitting the removal of dirty bundles that could not be pulled by usual means. After cleaning, bundles are replaced by the same equipment. *The M. W. Kellogg Co.*

IT'S NEW CHECK IT

25 TYPE CTL TUBING ELEVATOR meets all requirements for handling plain or upset tubing. It weighs less than 30 lb., is easy to operate, and has a rated capacity of 25 tons, with a safety factor of 4 to 1 based on the ultimate strength of the steel. Fits all diameter links 1¼ to 1¾ in. The hinge spring provides self-opening of the elevator when it is unlatched, forces the elevator off away from the tubing.



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and holds the elevator open. The type CTL Tubing Elevator is equipped with a sturdy stirrup-type latch and has a flame-hardened top bearing surface to insure long, economical service. *Web Wilson Oil Tools, Inc.*

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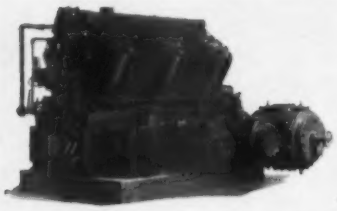
26 SVG, A GAS-ENGINE-DRIVEN COMPRESSOR, is essentially the well-known V-angle XVG compressor, but improved and modernized by a complete redesign from the ground up and from the inside out. The SVG retains all of those features that have been successful in the earlier models and adds the advantages secured by new materials, modern rotative speeds, and most modern manufacturing methods. This new compressor is built in two sizes, 330 hp. with six cylinders and 440 hp. with eight cylinders. Both sizes weigh about 20 per cent less per b.hp. than the XVG, with no sacrifice in ruggedness or dependability. Foundations are even smaller due to the better balance. Crank angles of 120° on the six-cylinder unit and 90° on the eight-cylinder unit, two power cylinders per compressor frame, lightweight aluminum power pistons with low inertia forces, and shaft counterweighting make the SVG a smoother-running machine. *Ingersoll-Rand Co.*



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27 B AND W LATCH ON CENTRALIZERS. The new Kon-Kave bow has greatly increased the strength or resistance to side-thrust. Centralizer spring employs the principle of the arch in its curved cross-section, and has unusual strength, providing positive centering of the casing, and insuring a uniform collar of cement entirely around it. The bow is drop-forged from alloy spring steel and the usual heat treatment is supplemented by additional treatment to relieve all internal stresses created in forming the bows and welding them to the hinged collars. Because only the curved back of the bows contacts the surface casing and formation, centralizers run smoothly without resorting to snubbing. *B and W, Inc.*

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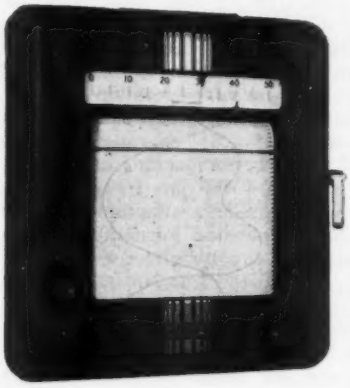
28 TYPE "E" TUBING HEAD has a working pressure of 2,000 psi. and a depth rating of 10,000 ft. It has a full-opening body which is provided with either flanged or screwed bottom connections for 7-in. and smaller casings. Blowout-preventer equipment may be readily applied to the type "E" tubing head since it has an 8⅝-in. male casing thread to which a broad flat cap is attached. Of a uniform height, it has a streamlined exterior which permits easy cleaning and maintenance. Interchangeable hanger types for 2⅜ and 2⅞-in. o.d. tubing allow maximum flexibility to the new tubing head. Each of these hangers is equipped with National lip-type pressure-actuated seal rings. *National Supply Co.*

IT'S NEW CHECK IT

29 NEW TWO-PEN RECORDER records two functions simultaneously against time. The instrument saves tedious compilation and point-by-point plotting of data. Since both functions are drawn as continuous curves users can follow swift-changing variables with ease. Two separate electronically amplified measuring circuits, two balancing motors, and two recording pens are all housed in one standard Speedomax case. Circuits can be supplied to work with thermocouples, Thermohms, strain gages, tachometers, thermal converters, pH cells, or most other types of primary elements. The instrument can operate controls or alarms. Recording pens operate overlapping or side-by-side, either across full scale or a specified portion of the full width. Chart speed can be selected in the range of 1 to 1,800 in. per hour. To aid in identification, the instrument draws one curve in red ink, the other in black. *Leeds & Northrup Co.*



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30 NEW PERRY COOLING-SYSTEM FILTER eliminates overheating troubles in tractor and stationary engines. Much of the engine-breakdown expense and lost time due to overheating troubles in liquid-cooled gasoline or diesel internal-combustion engines can now be eliminated. The cooling-system filter assures a constantly clean cooling system the year around and prevents scale insulation of block, water jackets, and radiator — eliminating the main cause of burned valves, scored pistons, and other expensive engine damage. The electrochemically activator filter placed in the coolant line will soften and clean the water or coolant and break up the accumulation of lime, rust, scale,

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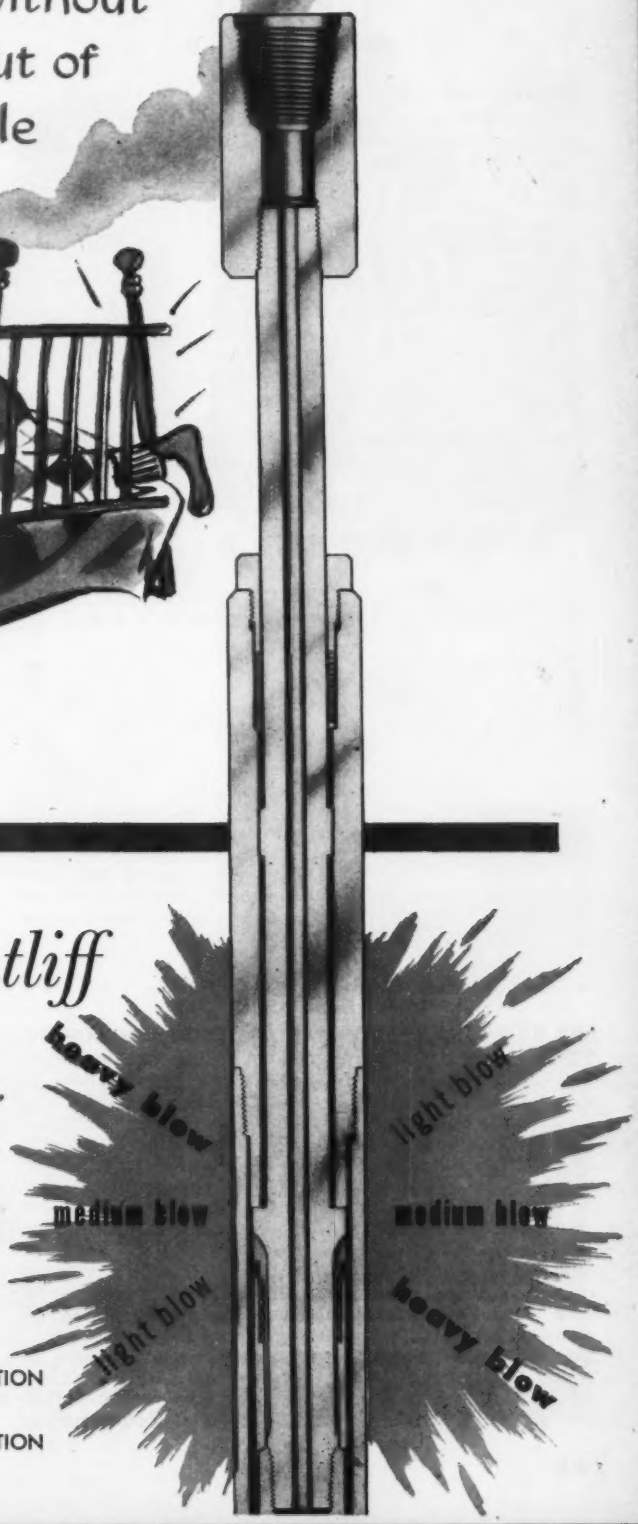

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"Exclusive Export Sales"

and sludge deposits in the radiator and cooling chambers of the motor block. Foreign matter is kept in suspension in the coolant, and as it gradually goes through the process of filtering, this residue is deposited within the filter. *Spark-O-Line Corp.*

IT'S NEW CHECK IT

31 **200-TON IDECO SHORTY BLOCK** is a unitized assembly which combine the block, spring-loaded link adapter, and swivel bail hook into a short, compact assembly. Added head room provided by this design permits faster operation as the pipe may be hoisted safely at full speed to the top of the run. The 200-ton capacity Shorty block has 36-in. Fabriform sheaves. Dynamically balanced for smooth operation, Fabriform sheaves give increased wire-line and sheave life. The Shorty block features a hydraulic cushion return that eliminates snap and jar of the hook. Available in 200, 125, and 65-ton capacities. *International Derrick & Equipment Co.*

IT'S NEW CHECK IT

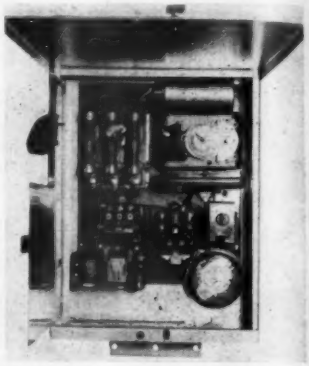
32 **CLIPPER PORTABLE MASONRY SAWS** are made in four models: two gasoline-powered Clippers, the Model C-75 with 7½-hp. engine and the C-130 with 13 hp. 2 cylinder engine, and Models C-15 and C-20 with electric motors. Outstanding features claimed are: Floating three-point suspension which eliminates blade binding as saw is moved over rough surface, positive screw feed, and streamlined design for ease of handling. *Clipper Manufacturing Co.*

IT'S NEW CHECK IT

33 **NEW LINE OF CORROSION-RESISTANT TUBING** will handle a variety of oxidizing and reducing corrodents. The new tubular products, called Alloys B and C, are made from strip of the Hastelloy analyses, trade-marked products of the Haynes Stellite Division, Union Carbide & Carbon Corp. Outstanding characteristics of Alloy B tubing or pipe is its unusually effective resistance to hydrochloric acid in all concentrations and at all temperatures, including boiling. It is also recommended for sulfuric acid at temperatures above 80° C. It is not recommended for oxidizing atmospheres. Because of its chromium content, Alloy C will withstand strong oxidizing conditions, such as those encountered with nitric acid, free chlorine, aqueous solutions of chlorine, and acid solutions of ferric and cupric salts. In addition, Alloy C will resist phosphoric acid and is highly resistant to acetic, formic, and sulfuric acids. Alloy C tubing and pipe are generally recommended for use with hydrochloric acid up to 50° C. Round tubing of these alloys is available, annealed and pickled, in sizes from ⅝ through 4½-in. Round pipe, Schedules 5 and 10, comes in sizes ⅜ through 4-in. I.P.S., while Schedule 40 pipe is made in sizes ⅜ through 1-in. I.P.S. *The Carpenter Steel Co.*

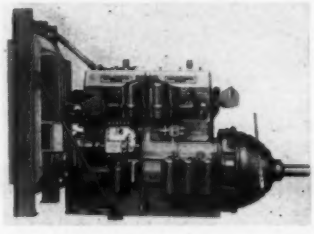
IT'S NEW CHECK IT

34 **NEW OIL-WELL PUMPING CONTROL** features new design in the magnetic starter, overload relay, motor disconnect switch, and lightning arrester. A new starting timer provides increased flexibility for starting motors after shutdown. An improved time switch with new camriders for more reliable time settings has also been developed. By far the outstanding feature of the new pumping control is its ability to withstand voltage surges of 22 kv. crest with a 1.5 by 40 wave and 10 000 amp. current crest. These values cover 90 per cent of probable lightning conditions. The magnetic starter is a three-pole lift-type starter equipped with a strongbox magnet coil to protect the coil from dust and dirt. Clamp-type solderless terminals and solid silver contacts are utilized throughout the component. *General Electric Co.*



IT'S NEW CHECK IT

35 **A NEW DIESEL POWER UNIT**, the Mogul Six, of 1,905 cu. in. displacement, and carrying a maximum continuous output rating of 201 hp. with overload capacity of 272 hp., is a four-cycle, solid-injection full diesel with a bore of 7 in. and stroke of 8¼ in. It has the spherical combustion chamber and is recommended for use with all modern, high speed diesel fuels of 45 cetane or above. A quick-conversion kit is available to convert this engine in the field, from diesel to natural gas, and vice versa without any internal parts being changed. *Waukesha Motor Co.*



IT'S NEW CHECK IT

36 **U. S. ROYAL 4 ROTARY HOSE** is a new wire-reinforced rubber and fabric rotary hose for high-pressure oil-well-drilling operations. Wire reinforcement together with fabric and rubber construction gives the hose the strength to withstand the pressure of the heaviest pumps in oil fields while retaining the flexibility and kink resistance needed for efficient drilling operations. The new hose will drill a well from top to bottom regardless of pump pressure required or gas pressure encountered. It eliminates the need for transferring from rubber to steel hose in high-pressure operations, a time a cost-consuming change. Extensive tests along the Gulf Coast have been made on both inland and offshore operations without a failure. *United States Rubber Co.*

IT'S NEW CHECK IT

Pipe Lines

Big Line Hinges on Hearing

WASHINGTON.—Colorado Interstate Gas Co. is making plans to begin construction in April of a 215-mile, 20-in. natural-gas pipe line from the Texas Panhandle to Colorado, according to Robert W. Hendee, president.

Plans for the new pipe line hinge upon approval by the Federal Power Commission of an application providing for the merger of Colorado Interstate with Canadian River Gas Co., he said.

Now attending hearings by the commission here, Hendee said that Colorado has a commitment for delivery of pipe for the new line by April 1. The line would be completed at a point near Kit Carson, Colo., by December.

The proposed enlargement of Colorado Interstate's system under the merger plan would cost approximately $15,000,000, and would make an additional 50,000,000 cu. ft. of gas daily available to Colorado customers immediately when the plan was put in effect.

Hendee said that growing defense activities in Colorado, especially in the Denver-Colorado Springs-Pueblo area, are placing a heavy strain on the company's system.

Phillips' Contracts Let

BARTLESVILLE, Okla.—Construction will start in a few days on a new 278-mile, 10-in. trunk line to transport crude from Phillips, Tex., to Yale, Okla., for Phillips Pipe Line Co., K. S. Adams, president of Phillips Petroleum Co., has announced.

Contracts have been awarded jointly to Brown-Lite Co., of Tulsa, and Arey-Phillips Construction Co., of Pampa, Tex. The line is scheduled to go into operation by June 1.

The new project will link the company's West Texas-to-Borger system with the Oklahoma-Kansas crude system. It will have a capacity of 25,000 bbl. per day, and will provide a greater outlet for Phillips' production in West Texas. It will also aid in supplying requirements for company refineries at Okmulgee and Kansas City, Kans.

New Facilities Authorized

WASHINGTON. — Southern Natural Gas Co. of Birmingham, Ala., has been authorized to construct pipeline facilities in Carroll County, Georgia, estimated to cost $287,840 in an initial decision by the Federal Power Commission and subject to review by that body. The order is also conditioned to require the company to supply natural gas to six communities in Alabama.

The project includes approximately 3½ miles of 24-in. loop line on Southern Natural's main line, and an additional 700 hp. at its Tarrant compressor station. The company proposes to use the facilities to provide 7,000,000 cu. ft. of additional natural gas per day to supply Atlanta Gas Light Co.

Southern Natural will have enlarged the estimated maximum daily capacity of its system to 555,000,000 cu. ft. of gas upon completion of these facilities and others previously authorized by FPC.

Alabama communities which had intervened in the proceedings to obtain natural-gas service were: Hokes Bluff, Helena, Eden, Columbiana, Morris, and Warrior.

GOING ACROSS.—Shown above working on the Brazos River crossing for R. H. Fulton Co., contractors for Trunkline Gas Co., are A. J. Scott, left, and Harold Bills.

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PIPE LINE CONSTRUCTION EXPERIENCE

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Pipe Line Equipment and Supplies
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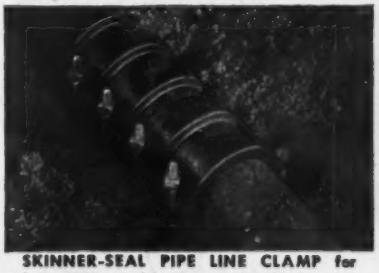
ANY PRESSURE — ANY TEMPERATURE

SKINNER-SEAL EMERGENCY PIPE CLAMP for pinhole or corrosion leaks.



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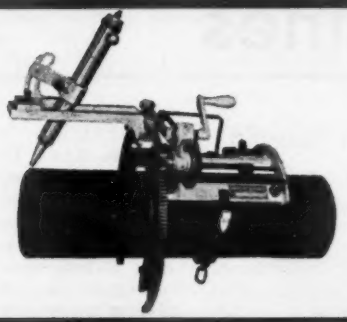
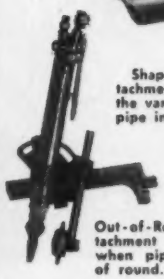
H&M PIPE CUTTING and BEVELING MACHINE



ATTACHMENTS

Shape Cutting Attachment for cutting the various shapes of pipe intersections.



Out-of-Round Attachment is used when pipe is out of round.

speed . . . . .

economy . . .

portability . .

Split horseshoe shaped gear permits machine to slip quickly over pipe. Fast operating screw chain fasteners hold it in place. A complete cut and bevel can be made in a 12 inch pipe in about two minutes.

You'll soon save several times the cost of the machine in labor, gas and transportation charges. H&M takes approximately one-half the labor and gas to make the cut as hand cutting and the work is all done in the field. Being this light (24 to 155 pounds) but durable machine to the pipe instead of moving the heavy pipe to the machine. Remember, H&M designs for SPEED and ECONOMY.

Let us arrange a demonstration to show you how H&M will save you money and time. Or write for further details . . .

H&M PIPE BEVELING MACHINE COMPANY

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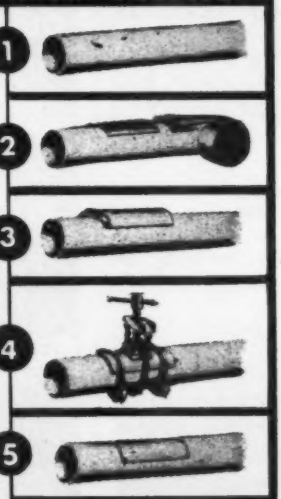
STOPS PIPE LINE LEAKS

SIMPLY and QUICKLY

1. Whatever size leak may be, simply cut necessary length of GRO-CORD gasket to cover generously.
2. Cut a piece of plate, or any ready-made half sole or sleeve, to extend about 1" on both sides and both ends of the gasket.
3. Fit plate over the gasket so it extends beyond the GRO-CORD pipe repair gasket on all sides.
4. Clamp repair tight with a chain jack to shut off the leak. Use clamps to hold plate or half sole in contact with the pipe at all points. Weld all around and REMOVE CLAMPS. If desired, chain jack may be left indefinitely until welding equipment is available. Gro-Cord gaskets have been in service as long as 5 years before final weld.
5. Permanent welded repair after chain jack removed.



Specially shaped Gro-Cord pipe repair gaskets are used by pipe line companies everywhere. Actually tested at 1600 p.s.i., Gro-Cord will not deteriorate. Oil resistant cotton impregnated stock lasts for years.

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May be used with welded or clamped repairs. Write for folder OGJ 49.

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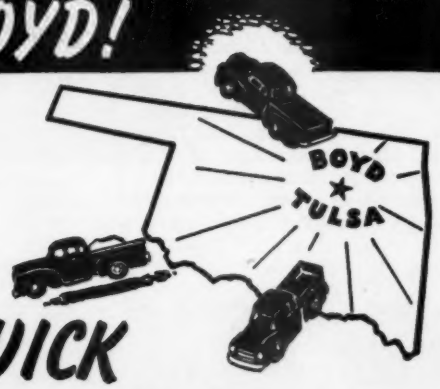

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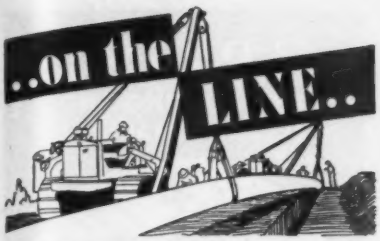

Britton Operations Now Centering in Northeast

WHILE J. C. Britton has been identified with the Southwest during a large part of his pipe-line-construction career, the activities of Britton Contracting Co. and Britton Construction Co. have been mostly in northern areas in the last 3 years. Three spreads are operated throughout the year largely in the laying of short loops and extensions for natural-gas systems connecting with storage reservoirs in Pennsylvania. Altogether these firms have laid nearly 800 miles of 4 to 29-in. pipe.

History: The present firms conducting Britton operations succeeded Britton & Clark, organized in collaboration with Roy Clark in 1945, after Britton returned from service in the Army.

J. C. Britton began working in pipeline construction in 1926 on a Burkburnett, Tex., job of Meador & Whitaker Co., predecessor of O. C. Whitaker Co. With the exception of his employment on the Sinclair and Stanolind pipe-line systems, Britton worked exclusively on Whitaker projects until the World War II period. For 3 years he was welding superintendent, for 4 years spreadman, and for 6 years general superintendent for Whitaker.

J. C. BRITTON

ROY CLARK

Soon after organizing Eastern Construction Co. in association with C. Hobson Dunn, he was commissioned in the Army in 1944 to supervise part of the construction of the India-Burma-China products pipe line built in 1944 and 1945.

Current operations: Britton jobs in progress early this year include the following: 50 miles for Manufacturers Light & Heat Co. in the Pittsburgh area; short lines to connect with fa-

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American Steel Works
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A SPARK CAN PUT YOU OUT OF BUSINESS

USE BERYLCO SAFETY TOOLS

Don't take a chance. On any job where there is the remotest danger of fire or explosion, it pays to use Berylco Safety Tools. Berylco Beryllium Copper Tools reduce the danger of sparking in the presence of inflammable liquids, gases and dusts. In addition, they are nonmagnetic and noncorrosive. Berylco Safety Tools resist heavy impact, retain their cutting edges, deliver high performance with long life.

Balance the loss of your plant, your irreplaceable equipment, and your continued production against the low-cost protection offered by these fine quality beryllium copper tools. Berylco Safety Tools are sold exclusively through jobbers; write for the name of the one nearest you. Use *his* stock as *your* inventory; rely on him for prompt service and help.

Write for Catalog 348, which describes and illustrates the complete line of Berylco Safety Tools.

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Circulation Department
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cilities of York Gas Co., York, Pa., and Corning Gas Co., Corning, N. Y.; as well as lines in the vicinity of Bradford, Pa. Last year 120 miles of 22-in. was laid for Mid-Valley Pipe Line Co. in the Clarksville, Tenn.-Elizabethtown, Ky., area. Some work yet remains to finish 60 miles of 8-in. for Tennessee Gas Transmission Co. near Elizabethtown.

Britton-Clark & Tarpley Engineering Co., an affiliated firm, will be building compressor stations this year.

Organizations: Britton Contracting Co. is owned by J. C. Britton and Roy Clark. Britton Construction Co. is a partnership formed by J. C. Britton, Herbert Britton, and Roy Clark, all of whom share with James Tarpley in the ownership of Britton-Clark & Tarpley Engineering Co. Headquarters are at Weatherford, Tex., for Britton activities; field operations are directed from an office at 93 South Main Street, Washington, Pa.

Humble Building 4-in. Line

HOUSTON.—A $200,000, 19-mile, 4-in. products line is being laid by Humble Oil & Refining Co. from its New London gasoline plant in Rusk County, Texas, to the chemical plant of Texas-Eastman Co. in Harrison County.

The new line will furnish propane and other light hydrocarbons to the chemical plant for use as raw materials. Shanks & Eutice, Inc., have the pipe-laying contract.

The products line parallels an 8-in. gas line which supplies the Eastman plant with fuel. It was also constructed by Humble and is supplied by a feeder line from the company's big gas reserve in the Trawick pool of Nacogdoches County.

Manual to Be Revised

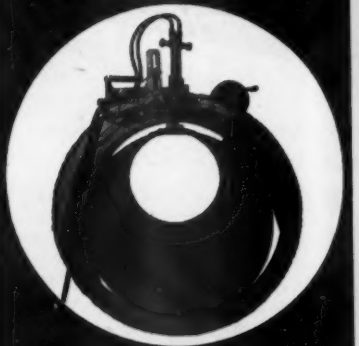
Pipe-line officials of the major oil companies attended a meeting of the American Petroleum Institute's vocational-training subcommittee February 5-7 in Tulsa primarily to revise certain chapters of the "Oil Transportation Practices Manual."

The manual was first published 10 years ago, and is the only existing source of information pertaining to pipe-line transportation, according to J. R. Mills, Service Pipe Line Co., chairman.

The revised edition of the manual is expected to be distributed some time in 1952, Mills said. It will include information pertaining to the transportation of petroleum products by pipe line, a use to which lines have been put increasingly in the past few years.

The new manual is being edited and published by the University of Texas under the direction of James R. D. Eddy, director of industrial and business training in the university's division of extension.

CROSE
PIPE CUTTING AND BEVELING MACHINE



EQUIPPED WITH OUT-OF-ROUND ATTACHMENT.
Machines to cut and bevel 16" pipe and over are furnished with out-of-round attachment.

EQUIPPED WITH STANDARD TORCH HOLDER
Machines to cut and bevel 14" pipe and under are furnished with Standard Torch Holder.

Crose pipe cutting and beveling machines are sturdy light weight construction made from cast aluminum. Simple operation. This machine has a split ring which enables it to be installed over the pipe for cut outs. The out-of-round cutting attachment allows you to cut true bevels on bent or egged pipe. Machines to cut and bevel pipe up to and including 36 inches in diameter are available for immediate delivery.

WRITE FOR BULLETIN BM1001

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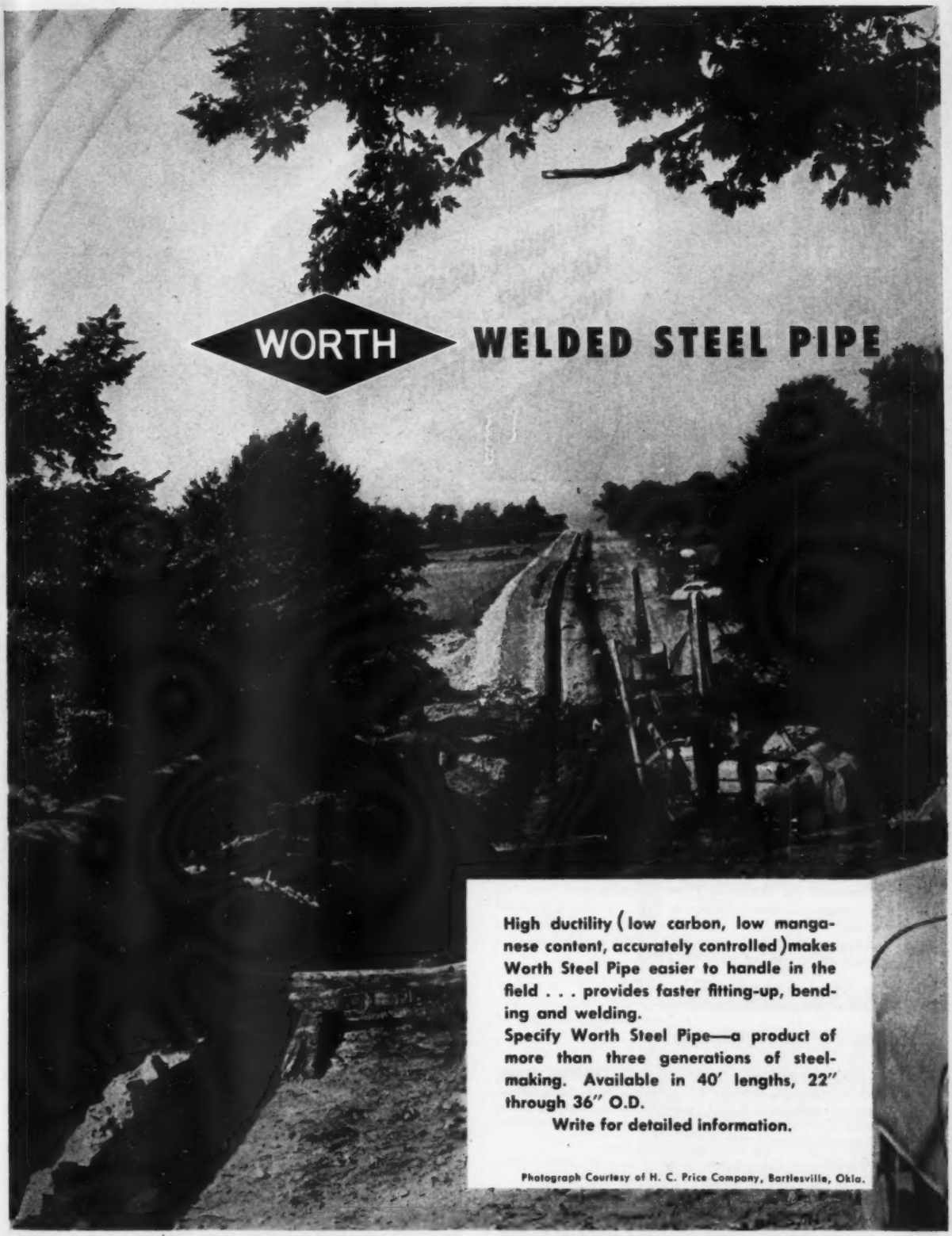

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Specify Worth Steel Pipe—a product of more than three generations of steelmaking. Available in 40′ lengths, 22″ through 36″ O.D.

Write for detailed information.

Photograph Courtesy of H. C. Price Company, Bartlesville, Okla.

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LARGE DIAMETER WELDED STEEL PIPE

WORTH STEEL COMPANY · Claymont, Delaware

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The extremely high peripheral speeds encountered in speed increasing and high-speed reducing applications present difficult problems in design and construction. These can be answered only by the kind of specialized engineering skill, manufacturing facilities and experience found at the Buffalo plant of Farrel-Birmingham.

SPEED INCREASING UNITS—Farrel Type SI units were the first speed increasers to be developed in a standard series for pipe line pumping service. That was eighteen years ago, and all of the original units, as well as those installed since, are still in operation.

The modern SI line consists of 49 standard sizes with speed ratios ranging from 1:1 to 12:1. For higher ratios, units using two sets of gears are supplied with ratio range from 12:1 to 40:1. Two-pinion units, designed to transmit power from a single engine to two pumps, are also available.

SEMI-HIGH SPEED UNITS — When requirements fall between the range of Type SI units and standard commercial speed reducers, Farrel semi-high speed units are recommended. These units are designed for pinion speeds up to 3600 RPM and gear pitch line velocities up to 4000 FPM.

Farrel engineers will be glad to help you select the right gear unit for your high-speed application. Write for further information about any of the types mentioned.

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Plants: Ansonia and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Cincinnati, Detroit, Chicago, Los Angeles, New Orleans

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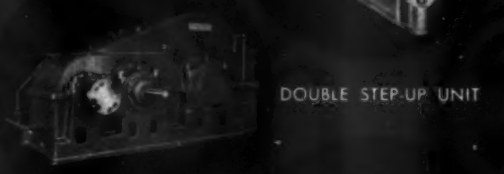
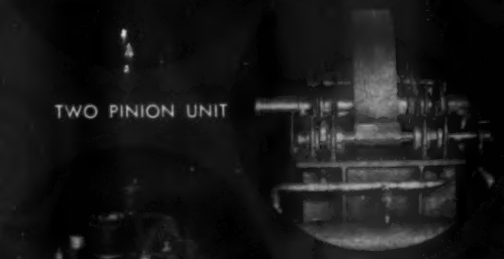
STANDARD SI UNIT


DOUBLE STEP-UP UNIT


TWO PINION UNIT

SEMI-HIGH SPEED UNIT

Among the Drilling Contractors

Three Pike Executives Given Higher Positions

S. I. WILLIAMS

Three changes in executive personnel of Thomas P. Pike Drilling Co., Los Angeles, have been announced by Thomas P. Pike, president. Stanwood I. Williams, vice president, has been made executive vice president. H. G. Haney, vice president and drilling superintendent, has been made manager of drilling operations in addition to his position of vice

H. G. HANEY

JOHN FOWLER

president. John Fowler, formerly assistant to Haney, succeeds him as drilling superintendent.

Williams has been associated with the company since 1944. He is a 1930 graduate of Stanford University, where he majored in geology, and did graduate work at Massachusetts Institute of Technology. Leaving school, he spent a year (1932) working in Wyoming oil fields, and the next 2 years on drilling rigs in California fields. He joined the sales force of Republic Supply Co. of California in 1935 and continued with that company until 1938, when he resigned to become a consultant on geology, leases and royalties.

Haney, who joined the company in 1938 as drilling superintendent, has worked in oil fields since he was 19 years old. He started as a roughneck at Burkburnett, Tex., and spent the first 3 years in various other fields in Texas and Oklahoma. He got his first drilling job at Mexia, Tex., in 1922, and then moved to California where he drilled for several companies at Signal Hill until 1925. He spent the next several years in foreign fields, first as a driller at Tampico, Mexico, for 4 months, then as a toolpusher in Venezuela for a year, and lastly as a driller in the Dutch East Indies. He returned to California in 1931.

Fowler first went to work for the company in 1941. He left in 1942 to enlist in the Navy, serving as a Seabee, first in North Africa, and then, in 1945, in the Elk Hills naval reserve field. Following his discharge from the Navy in the latter year he took a position as engineer in charge of Kern Oil Co.'s San Joaquin Valley division. Resigning this position, he returned to Pike as toolpusher. Prior to his first connection with this company, he has been a petroleum engineer with Standard Oil Co. for 5 years in its Kettleman Hills, Taft, and Los Angeles Basin operations, and for a short period with Long Beach Oil Development Co., to which company he had been lent by Standard. He is a graduate in mechanical engineering from Stanford University in the class of 1936.

Sharp Decline Felt in Number of Active Rigs

A sharp drop in the number of rotary rigs operating in the United States and western Canada was experienced during the week ended February 5. It pushed the total to the lowest level since the middle of last May. However, there still were 171 more rigs running than at the same time a year ago. It was then that drilling activity in 1950 was at its lowest level. The number of active rigs now is more than 400 under what it was early last December when drilling was at an all-time "high."

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 2-5-51	Change week ended 1-29-51	Change week ended 2-6-50
Gulf Coast	467	—68	— 24
W. Tex.-N. M.	708	—10	+ 23
Ark.-N. La.-E. Tex.	126	— 9	— 4
Oklahoma	258	—10	+ 30
Kansas-Nebraska	153	+ 9	+ 59
Illinois-Eastern	83	+12	+ 27
Rocky Mountains	101	—10	+ 39
Pacific Coast	122	— 7	— 17
Total U. S.	2,018	—93	+133
Western Canada	101	— 3	+ 38
Total	2,119	—96	+171

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown by charts on pages 158 and 159.

Briscoe & Clingman Drilling Co., Oklahoma City, is drilling for Powell Briscoe, Inc., at 1 Casey, NW SE SE

The man on the rig knows that for a tight seal and easy separation of parts you can't beat 'Bestolife Lead Seal Tool Joint and Casing Compound. Standard of the oil industry for 20 years. Unconditionally guaranteed. Sold and exported by supply houses throughout the world.

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24-6n-7e, a semiwildcat test located northwest of the East Sasakwa pool, Seminole County, Oklahoma. Contract is for 4,300 ft.

New Drilling Company

Norman D. FitzGerald, Abilene, Tex., and D. D. St. John, formerly of Olney and Ballinger, Tex., have organized the Saxon Drilling Co. to engage in drilling operations in the West Central Texas region. FitzGerald will supervise operations. The new company has a rotary rig adapted to drilling depths of 2,000 to 4,000 ft.

Calvert Runs Four Rigs

Calvert Drilling Inc., Olney, Ill., currently has four rigs running in Illinois. Three are on contract jobs, one for Carter Oil Co. at 1 Freeman, in 14-5n-6s, Clay County; another for Stewart Oil Co. at 1 Morrell, in 5-9n-3w, Montgomery County; and the third for J. W. Gallagher at 1 Porter, in 23-1s-6e, Wayne County. The fourth rig is on this company's 1 W. B. Baird and Joint Stock Land Bank, in 2-2s-13w, Wabash County.

Unit Drilling Co. is drilling another well for H. T. Mastin in the Olean pool, Creek County, Oklahoma. The new operation is 1 Shella, located in the NE NW SE 5-16n-8e.

K. & E. Drilling Co., Wichita, is drilling a wildcat test in northeastern Grant County, Oklahoma, for Imperial Petroleum Co. The test, 1 Atkinson, is located in the NW NW SE 18-29n-3w, northeast of Renfrow. It is near the Kansas line.

Tiger Drilling Co., Oklahoma City, is moving in to drill another well for Ashland Oil & Refining Co. in the Wicher pool, eastern Oklahoma County, Oklahoma. Latest operation is 1 Bokley-Day, NW NW NW 15-12n-2w.

B & R Drilling Co., Wichita, is the contractor on a wildcat test which H. V. Elwell and H. E. Clare are drilling in western Butler County, Kansas. Test is 1 Elwell, NE NE SW 15-27-3e. Location is about 2½ miles southeast of Andover and about 10 miles east of Wichita.

Kerr-McGee Oil Industries, Inc., Oklahoma City, has been awarded the contract for Stanolind Oil & Gas Co.'s second test to be drilled in the Harrisburg area, in Banner County, Nebraska. The new test, 2 Lovercheck-State, is located in the C SW SE 17-18n-55w, about 1½ miles southwest of the first test, a dry hole. Kerr-McGee has a rig working for its own account on a location near the Harrisburg townsite, about 3 miles north of the Stanolind location, and where it has a prospective oil discovery well in the lower Muddy sand at a total depth of 5,907 ft.

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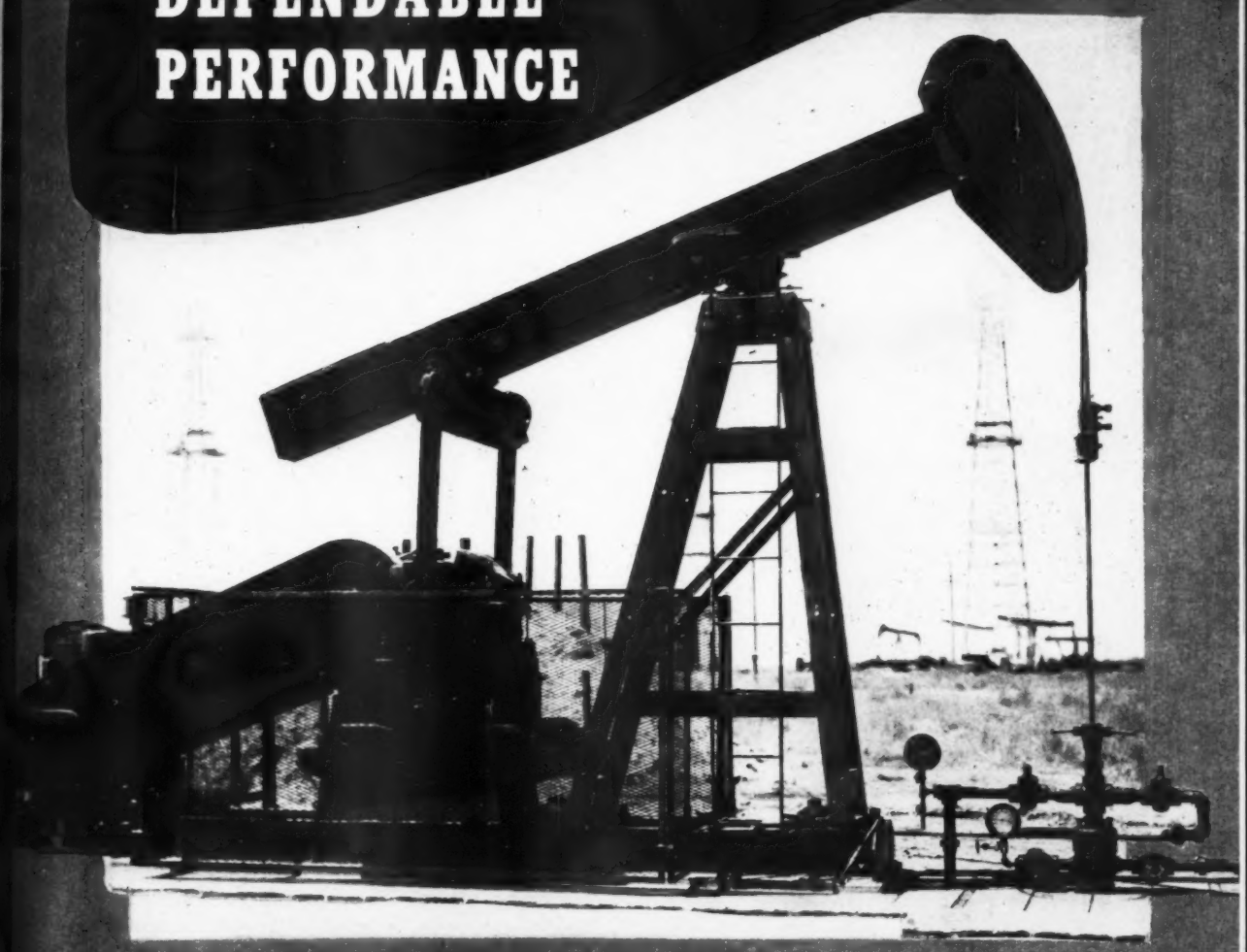

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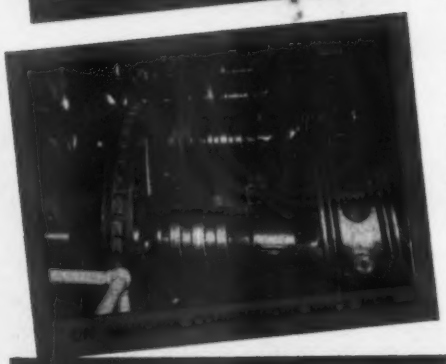

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NATURAL GAS

A.G.A. Plans Convention

ST. LOUIS.—The thirty-third annual convention of the American Gas Association will be held over a 3-day span instead of 4 days, as originally planned. The announcement came from Robert W. Otto, president of Laclede Gas Co. and chairman of the A.G.A. general-convention committee, who said the change was made in the interest of economy both in expense and manpower in the light of the present national outlook.

The convention will be held in St. Louis, October 15-17, with the headquarters of the association, convention registration, and as many meetings as possible in Kiel Auditorium.

The joint meeting of the natural and manufactured-gas departments and the general sessions meeting will be held in Kiel. General sessions will be held each of the three mornings, with possibly two addresses on Monday and three each on Tuesday and Wednesday mornings. Negotiations are under way to secure outstanding speakers.

Each of the four sections of A.G.A. has been requested to hold not more than two meetings. Each section will have an opportunity to submit several subjects and speakers for selection by the general committee for general sessions programs.

Registration fee is $10, and advance registrations may be made with A.G.A. headquarters.

Storage Pool Sought

WASHINGTON.—New York State Natural Gas Corp. has announced plans to acquire the South Bend storage area in Armstrong and Indiana counties, Pennsylvania, provided the Federal Power Commission rules favorably on the company's application.

The South Bend pool has an estimated storage capacity of 13,000,000,000 cu. ft. of gas, and an estimated daily deliverability of 100,000,000 cu. ft. or more.

In order to inject and withdraw gas from the pool and make delivery to Peoples Natural Gas Co., of Pittsburgh, and East Ohio Gas Co., of Cleveland, both affiliates of New York State Natural, the company plans to construct a 77-mile, 20-in. transmission line from the storage area to a point on the Ohio - Pennsylvania state line in Lawrence County, Pennsylvania.

The company has also applied for permission to construct 17 miles of gathering lines, a 12,000 - hp. compressor station, and other facilities necessary to use the area for underground storage.

Cost is judged at approximately $8,969,100, which would be financed by sale of securities to the parent company, Consolidated Natural Gas Co.

New York State Natural plans to acquire the property from Peoples Natural Gas Co., of Pittsburgh.

Sun Oil Moves to Save Gas

TOLEDO.—Sun Oil Co. is shifting to the use of heavy fuel oil for heating boilers at its refinery here, so that an additional 2½ million cubic feet per day of refinery gas can be made available for domestic use during the cold wave.

Diversion of the refinery gas will begin as soon as the necessary connections can be made and will continue for the duration of the gas emergency in the Toledo area. The arrangement was made in cooperation with Ohio Fuel Gas Co.

O.N.G. Gas Sufficient

OKLAHOMA CITY.—Joseph Bowes, president of Oklahoma Natural Gas Co., assured the Oklahoma legislature last week that the company has contracts for sufficient gas and adequate pipe-line capacity to care for all its customers now under contract at any temperature—barring pipe-line breaks.

The meeting of company officials and the legislative committee was called after an extreme cold snap forced several industrial plants in northeastern Oklahoma to shut down for lack of gas.

The curtailment of service brought forth a protest by affected plants against the O.N.G. rate system through which several plants received a normal full quota of gas by paying a preferential rate. The Oklahoma Corporation Commission then ordered the company to abolish the more expensive "preferred service," and O.N.G. complied.

In defense of the company's rate system, Bowes pointed out that it was given official sanction by the commission when originally submitted, that the service was optional, and that similar classifications are practically universally recognized in the gas business.

Revised Plan Submitted

WASHINGTON.—Public Service Co. of North Carolina, Inc., has laid plans for a proposed natural-gas system, designed to serve 34 communities in North Carolina, before the Federal Power Commission for approval.

The application is the second filed by the company and was revised when the commission approved a gas-service plan by Piedmont Natural Gas Co., Inc., of Spartanburg, S. C., last month which included certain markets also applied for by Public Service.

The company in its new application is proposing to build seven lateral lines, aggregating about 168 miles, to carry natural gas from Transcontinental Gas Pipe Line Corp.'s main line to the communities it proposes to serve. Six of the laterals would carry gas from Transcontinental, while the seventh would hook in with Piedmont's system. Piedmont is to be supplied by Transcontinental.

Public Service estimates its requirements as ranging from 1,493,800,000 cu. ft. in the first year to 8,172,000,000 during the fifth year. Estimated total cost of the proposed facilities is approximately $4,500,000.

Natural Gasoline

Permian N.G.A.A. to Meet

BIG SPRING, Tex.—A number of papers of interest to natural-gasoline men will be presented at the Permian basin regional meeting of the Natural Gasoline Association of America, which will be held in the Settles Hotel here February 23. E. D. Dickey, Shell Oil Co., Midland, Tex., is program chairman.

Papers to be presented in the four sessions include:

"Maintenance and Operation of Compressors," S. B. Lamb, Cooper-Bessemer Corp., Mt. Vernon, Ohio; "The Prevention of Accidents in Natural Gasoline Plants," Henry Boggess, Sinclair Oil & Gas Co., Tulsa; "Operation and Maintenance of Mechanical Drive Turbines," W. B. Yard, Elliott Co., Jeannette, Pa.

City Converts to Propane

ESCANABA, Mich.—Propane gas will be turned into city mains here this fall to cook meals and furnish heat for 2,700 homes, according to A. V. Aronson, city manager.

All homes inside Escanaba's city limits will use the new fuel which will replace manufactured gas used here for 37 years.

Engineering work involved in changing to the propane-air mix gas will be done by Lundstrum & Skubic, of Chicago, which recently installed propane-heating equipment in the 67 - unit Kenwood apartments in Hammond, Ind. The firm claims that propane will be more economical than water gas after the initial expenditure for the changeover is taken care of.

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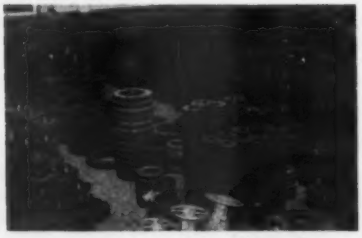

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REFINING

Grease Facilities Planned

CHICAGO.—Facilities capable of producing 8,500,000 lb. of grease per year will be installed in Cities Service Oil Co.'s Chicago terminal and compound plant by the end of the year, A. W. Ambrose, president, said last week.

The Chicago compound plant was completed last year and provisions were made in the initial building to house a grease plant. A modification of the Stratco process will be used in the new grease-making facilities which are to be installed under the direction of the Cities Service engineering department.

While rated capacity will be 8,500,000 lb. annually, peak loads representing 150 per cent of capacity will be possible for short periods.

The facilities represent the second phase in a program to make the Chicago plant an integral source for both lubricating oils and grease in the Great Lakes area. Southwestern states are supplied from the Ponca City, Okla., refinery and compound plant.

Company Forms Affiliate

OIL CITY, Pa.—Continental Refining Co. has announced that it has transfered all of its manufacturing, purchasing, and sales activities to Coreco Oil, Inc., a newly formed affiliate, effective February 1.

Continental Refining will function as a holding company for Coreco, and officers and directors of Continental will hold identical positions in the new company. Management and personnel will remain unchanged.

Coreco Oil, Inc., will continue the manufacture and sale of branded and unbranded lubricating oils and other petroleum products in this country and abroad formerly conducted under the name of Continental.

Officers and directors of Continental Refining Co. and Coreco Oil, Inc., are A. B. Weingard, president; R. F. Weingard, vice president and general manager; J. B. Crawford, vice president and secretary; Richard T. Glenn, vice president and treasurer; and R. F. Anderton, plant superintendent.

Asphalt Research Pushed

PHILADELPHIA.—Twenty-one companies, including eight oil-company organizations, have banded together to establish a national asphalt-research center here which will serve the entire asphalt industry in the United States.

A spokesman for Franklin Institute Laboratories, organizer of the center, said that it was established so that each company could share benefits at low individual cost of "a continuing, thorough, scientific attack on fundamental problems of the industry."

Oil-company organizations sponsoring the center are Cities Service Research Development Co., New York; Globe Oil & Refining Co., Wichita; Gulf Research & Development Co., Pittsburgh; Ohio Oil Co., Findlay, Ohio; Sinclair Refining Co., New York; Standard Oil Co. (Ohio), Cleveland; Standard Oil Co. (Ind.), Chicago; and Sun Oil Co., Philadelphia.

Waste Products Utilized

TORRANCE, Calif.—General Petroleum Corp. has completed a $250,000 improvement project at its refinery here, enabling it to produce ammonium sulfate, a chemical fertilizer, from two former refinery waste products.

The new unit, built and engineered by Fluor Corp., Ltd., produces 11 tons a day of ammonium sulfate, a nitrogen-bearing chemical used by California farmers for fertilizer. It uses refinery waste gases and acid sludge. The latter is a waste item which normally presents refineries with a difficult and expensive disposal job.

Patent applications are pending on the new process, which was conceived and developed by General Petroleum Corp. engineers and chemists.

Antiknock Road Tests Vital

The theory that road antiknock performances of gasolines cannot always be accurately predicted from their laboratory ratings, was advanced by M. L. Alspaugh, research engineer for the Ethyl Corp. in an address before the Mid-Continent Section meeting of the Society of Automotive Engineers in Tulsa last week.

In order to obtain a realistic road rating of a fuel, it is necessary to make ratings in a number of makes of vehicles whose antiknock requirements it is intended to satisfy. The fuel technologist must recognize that changes in atmospheric conditions as well as differences in ignition timings can affect fuel ratings, he said.

Why road ratings differ so widely (four or more octane numbers) in a given car for fuels of equal research octane number cannot be answered fully as yet. According to Alspaugh, neither the tetraethyl lead content nor the differences in motor-method ratings appear to be factors.

The borderline procedure, which is used in research and development work, has shown that the research and motor octane numbers may be indica-

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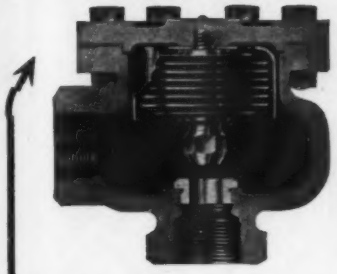

Wherever back-up of condensate is a problem Nicholson steam traps are increasingly specified. They are universally recommended for eliminating "cold blow" in unit heaters. Plant records show production of cooking kettles increased as much as 30%. 5 types for every application. Size ¼" to 2", press. to 225 lbs. BULL. 450.

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tive of low and high-speed antiknock performance, respectively, and the fuels which give the best road performance throughout the speed range are generally those which have the highest motor rating for a given research rating, Alspaugh said.

Depending on their hydrocarbon content, highly sensitive fuels may actually give inferior high-speed antiknock performance even when they have a reasonable motor-octane number.

The maximum antiknock requirement may or may not be changed with the use of torque-convertor type of automatic transmission depending on the engine, he said.

Pollution Committee Formed

PHILADELPHIA. — Reflecting the added attention now given the problem of air pollution by the refining and other industries, the American Society for Testing Materials has organized a new committee to cover methods of atmospheric sampling and analysis.

Designated Committee D-22, the new group will not concern itself with the fixing of permissible limits or with enforcement problems attending actual air pollution, but will work toward the formulation of standard methods for sampling and analysis, the selection of acceptable nomenclature and definitions, and the stimulation of research.

Dr. L. C. McCabe, Air and Stream Pollution, U. S. Bureau of Mines, has been designated temporary chairman of the new committee. At preliminary meetings held by a steering committee it was decided that the body's studies would include both plant and outside environments. The initial subcommittee organization will include groups devoting attention to nomenclature and units, methods of sampling, analytical methods, and instrumentation.

Crude Research Continues

LARAMIE, Wyo.—The University of Wyoming has been using a high-intensity sound beam in experimental efforts to find an economic method of removing sulfur and asphaltines from the state's black crudes.

Value of Wyoming's tremendous reserves of the black crude would be increased appreciably if the experiments prove successful.

Two departments are now working on aspects of the problem—the natural-resources-research institute and the department of physics.

The physics department, headed by Dr. John K. Wood, assistant professor, is directing a sound beam through crude in hopes of breaking up asphaltines. Dr. Henry Rakoff of the research institute is heading a project to develop a commercially feasible method of reducing the sulfur content.

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Take Note, Mr. Congressman

IF the constant increases in estimates of proven reserves of petroleum in this country and the quantitative estimates of reserves yet to be proven aren't enough to convince you that the United States is not "running out of oil," there's a new book you should read. If you think we are running out of oil because of a dwindling in size and number of sedimentary units in which there exist reasonable expectations of finding oil pools, get a copy of "Possible Future Petroleum Provinces of North America," published by the American Association of Petroleum Geologists, and find out how wrong you are.

It's true that every discovery well has lowered the volume of potential oil-bearing rocks, but it is also true that a selected few of these wells have broadened geologic thinking to such an extent that the net result has been a continuous recognition of more and more potential volume.

Way back somewhere someone is supposed to have said that he'd drink all of the oil found west of the Mississippi. Then, after the turn of the century came such ideas as "there's no oil in the red beds of West Texas and Oklahoma, and it's impossible to drill deep enough to test the older beds that might be present." A list of large pools in once-condemned areas and at once-unimagined depths would overflow this page.

In just the last 10 years, since the first comprehensive inventory was made, this country's prospective volume has grown. More geologic basins have joined the ranks because more is known about them. And, equally as important, actually more important in the immediate future, are the deeper horizons and major-extension possibilities in known oil-producing provinces. During the last 10 years another 5,000 ft. of depth have been proven to be within reach of the drill to add to the volume considered potential. The limit is now set at 20,000 ft., but the ultimate effect of sediments at yet greater depths is not ruled out.

No, in spite of the hundreds of successful wildcats drilled each year, the recognized prospective oil-producing country in the United States has not begun to dwindle. Sedimentary provinces are no longer condemned. All of those provinces considered potential 10 years ago are still considered potential today though some have begun producing from fractional portions. New ones have been added through generally accepted ideas such as the importance of reefs and the potentialities of the Continental Shelf in some areas.

"Possible Future Petroleum Provinces of North America" is the outgrowth of an idea conceived by A. I. Levorsen in 1940, which was "to take an inventory of the merchandise we have in our warehouse—to get an over-all picture of the undiscovered oil resources of that part of the continent north of the Rio Grande." The immediate result of Levorsen's idea was A.A.P.G.'s publication, in 1941, of "Possible Future Oil Provinces of the United States and Canada," a small book which required over 8,000 copies in addition to members' bulletins to satisfy the demand. Now comes a new book, a symposium prepared by some of North America's outstanding geologists, the scope of which goes on south of the Rio Grande to include Mexico.

The volume contains descriptions of nearly twice as many possible petroleum provinces as the 1941 volume. (Shaded areas on map are those whose future petroleum possibilities are discussed in the book.) The new book, with a forward by Max W. Ball, chairman of the symposium, has 358 pages with many maps, cross-sections, and selected references. Cloth-bound books will soon be available for $4 a copy. Write A.A.P.G., Box 979, Tulsa.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTH LOUISIANA.—New deep pay has been opened in Avery Island field, Iberia Parish, at Humble Oil & Refining Co. B-21 Petit Anse Co., 23-13s-5e. The well flowed 641 bbl. of 32°-gravity oil daily through perforations at 12,779-85 ft.

MISSISSIPPI.—Magnolia Petroleum Co. 1 Tyer-Swayze unit "B," 11-5n-2w, new pay in Kingston field, Adams County, had the highest potential of any wells in the field, when it came in flowing 312 bbl. of 39°-gravity oil daily through 12/64-in. choke. Operator perforated at 6,605-09 ft.

WEST TEXAS.—The southeast corner of Midland County, and area over the line in Upton County, had prospects of additional Spraberry strikes. Magnolia's 1 Sam Preston was running high to both the Driver discovery and Midkiff field, and core recoveries had sand with good oil odor and some shows. Ted Weiner 1-17 Braden logged shows of oil and indicated saturation of 140 ft., net, and recovered 480 ft. of clean oil on drill-stem test. In Crockett County, Cities Service and others completed 1-D Owens as a gas-distillate discovery, with open-flow potential figured at 40,000,000 cu. ft. daily, plus 1,700 bbl. of 75°-gravity distillate.

ROCKY MOUNTAIN AREA.—California Co. announced location for a deep Devonian test in the St. George area of southwestern Utah, a new area of interest in oil exploration. Phillips Petroleum Co. tested water from basal Pennsylvanian (?) at the Juniper anticline deep test, Idaho. Oil was recovered from a new horizon at a British-American Oil Producing Co. extension in Yenter pool, Logan County, Colorado.

XUM

California

Three Discoveries Pace Week's Work

LOS ANGELES.—West Montalvo field of Coastal California has been given a deeper producing zone, Elk Hills field in San Joaquin Valley, a shallower sand in the Stevens zone, and between Mountain View and South Edison fields in Kern County, a new oil discovery was completed.

At West Montalvo, where nine producers have been completed in a 9,500-ft. Repetto sand, oil production was established in a 11,800-ft. Sespe sand. The discovery well was Standard Oil Co. of California 148-12 McGrath, in Section 26-2n-23w. It was completed for a 200-bbl. per day producer from perforations at 11,810-21 ft. Gravity of the crude was 20.6°.

At Elk Hills, in an upper Stevens sand that heretofore has been passed up in the several wells which encountered it, California Standard completed a 34°-gravity producer rated at 2,900 bbl. daily. The pool opener, located in Section 36-30s-23e and in the west-central part of the field, topped the Stevents zone fairly high. Top of the new oil sand was called at 5,825 ft. with its base at 6,972 ft. The hole was carried to a total depth of 7,016 ft. The oil flow was obtained through perforations at 6,475-6,650 ft., 6,665-6,830 ft., and 6,845-6,958 ft.

The new discovery between Mountain View and Edison, in Kern County, was Independent Exploration Co. 1 Means in Section 34-30s-29e. It was completed as a 175-bbl. flowing-pumping producer of 21.8°-gravity crude in the Chanac sand at 4,267-4,608 ft. The strike is about 1 mile east of Mountain View production and almost that far west of South Edison development.

More development is scheduled for the shallow oil discovery made by General Petroleum Corp. last November on its Ethel-D lease, 1 mile north of Maricopa in old Sunset field. General Petroleum is completing its third producer in the 2,500-2,600-ft. pay, passed up when the deeper pays were being developed at the turn of the century. This well, on a 45-minute test last week, flowed 27 bbl. of 19°-gravity crude. California Standard, which holds the west adjoining acreage, shortly will start its 103 Ethel-D, offset to General Petroleum's third well.

In the Carrizo Plains area of San Luis Obispo County, Shell Oil Co. has staked location for a wildcat about 6 miles west of Simmler. The test will be 28-30 McDonald estate in SW SW Section 30-29s-18e, an area where very little wildcatting has been done.

Southwest of Edison in Kern County, Rex Oil Co. has staked its 1-A Tejon in SE Section 23-30s-30e, about 5 miles east of Edison field. In Section 31 of the same township, San Joaquin Drilling Co. will drill 3 Di Giorgio. It will be the third shallow test for the company in this area.

In the southeastern end of Cuyama Valley, San Luis Obispo County, Richfield Oil Corp. was rigging up two new wildcats. Its A-1 Mettler will be in Section 13-10-25w, about 12 miles northeast of South Cuyama production; the second is C-2 Russell in Section 10-10n-26w.

About 1 mile north of North Antelope Hills in Kern County, where Shell opened heavy oil production at about 2,300 ft., The Texas Co. reportedly was preparing to drill a test on some recently acquired acreage. The wildcat will be its 1 Effie Martin in Section 14-27s-19e.

CALIFORNIA UNSUCCESSFUL WILDCATS

Kings County, Pyramid Hills area: General Production Co. 4 Well, 8-24s-18e, dry, TD 1,233 ft., elev. 790 ft.

Los Angeles County, Calabasas area: F. G. Anderson 1 Mable, 23-1n-18w, dry, TD 4,095 ft., elev. 950 ft.

Madera County, Chowchilla area: Los Nietos Co. 54-17 Chowchilla Farms, 17-10s-14e, dry, TD 2,901 ft., elev. 142 ft.

San Bernardino County, Kramer area: Jack Radovich 1 Radovich, 3-10n-5w, dry, TD 3,160 ft., elev. 2,250 ft.

San Luis Obispo County, Bitterwater Creek area: Ohio Oil Co. 1 Fred Porter, 30-11n-24w, dry, TD 3,758 ft., elev. 2,440 ft.

Ventura County, Simi area: Simian Oil Corp. 1 Simian, 14-2n-18w, dry, TD 1,156 ft., elev. 989 ft.

Yolo County, Winters area: D. D. Feldman Oil & Gas Co. 8-1 Woodward-Reynolds Comm., 13-8n-1w, dry, Basal Capay grit 4,370 ft., TD 4,950 ft., elev. 125 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, East Mountain View area: new field—Independent Exploration Co. 1 Means, 34-30s-29e, pumped and flowed at the rate of 175 bbl. 21.8°-gravity oil per day through perf. at 4,267-4,608 ft., Chanac sand 4,268 ft., Santa Margarita 4,620 ft., schist 4,917 ft., PB 4,609 ft., TD 4,918 ft., elev. 495 ft.

Tehama County, South Dome area: new gas discovery—Buttes Oil Fields, Inc. "A" Saldubehere Buttes, 25-24n-3w, flowed at the rate of 10,000,000 cu. ft. of gas per day through 1-in. bean from perf. at 1,560-75 ft., TD 2,365 ft., elev. 240 ft.

Ventura County, new pay in West Montalvo field: Standard Oil Co. 148-12 McGrath, 26-2n-23w, flowed at the rate of 238 bbl. 19.7°-gravity oil per day through perf. at 11,810-21 ft., 74/64-in. bean, redrilled to 11,831 ft., TD 12,110 ft., elev. 24 ft.

Mississippi

Kingston New Pay Tests Highest Potential So Far

JACKSON.—A new Wilcox sand zone has been opened in Kingston field, Adams County, at Magnolia Petroleum Co. 1 Tyer-Swayze unit "B," 11-5n-2w. Through perforations at 6,605-09 ft. in the Harman sand, it flowed 312 bbl. of 39°-gravity oil daily through 12/64-in. choke. Tubing pressure was 600 psi. This is the highest potential test to date in this field. The well is a southeast offset to the field discovery and is the third well for the field completed by Magnolia. Each of the three wells has been completed in a different Wilcox sand zone.

In the Thompson Creek area of southwestern Wayne County, Tip Ray-I. P. LaRue, Jr. 1 Gaines Sanderson, 31-7n-8w, had first drilling break in the Eutaw section at 6,284 ft. (—6,044 ft.). Core was cut at 6,286-96 ft. with recovery being 10 ft. of grey-green sand and silty sand with slight salty taste and no show of oil or gas. At last report, operators were drilling ahead below 6,525 ft.

Testing operations are under way at Jefferson County's prospective gas-condensate discovery, Sinclair Oil & Gas Co. 1 R. T. Liddell, et al, 67-9n-1e. Hole is bottomed at 10,278 ft.

In Rankin County, Lion Oil Co. 1 Denkmann, 22-7n-4e, is still fishing. The projected Smackover test is at total depth of 13,186 ft. The venture has been fishing for the past 9 weeks.

Honolulu Oil Corp. 1 Board of Supervisors, 16-5n-9e, Scott County, stuck drill pipe while coming out of hole to change bit after circulating on bottom during the time it was too icy to make a round trip. At last report, the fish had been recovered and operators were drilling at 9,626 ft.

George Vasen 1 Tung Oil Corp., 9-2s-11w, wildcat test in Stone County, has passed the 20,000-ft. mark, making it the second well to ever reach that depth. The well has been cored solidly from 14,115 ft. to present depth.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: New pay, Kingston—Magnolia Petroleum Co. 1 Tyer-Swayze unit "B," 11-5n-2w, TD 6,732 ft., perf. 6,605-09 ft., 312 bbl. oil per day, 12/64-in. choke, 39° gravity, TP 600 psi.

MISSISSIPPI WILDCAT FAILURE

Smith County: Amerada Petroleum Corp. 1 U. S. A.-Klein, 21-4n-8e, dry, TD 6,364 ft.

Texas Gulf Coast

Hardin County Wildcat Flows Oil on Tests

HOUSTON.—Three miles northeast of Batson, Hardin County, Stanolind Oil & Gas Co. 1 Kirby Lumber Co., Hardin County School Land Survey, A-260, flowed 104 bbl. of 37°-gravity oil daily on a 13-hour drill-stem test. The wildcat was first perforated at 7,250-60 ft. and made some oil but finally went to 100 per cent salt water. Operator squeezed these perforations and perforated at 7,238-40 ft. for completion attempt. Production was through a 12/64-in. choke, with a pressure of 500 psi. The hole is bottomed at 7,400 ft. with liner run to total depth.

Another new pool is apparently being opened in Austin County at The Texas Co. 1 H. H. Marek, F. Ernest Survey, Abstract 35. On a drill-stem test through perforations at 9,760-96 ft. and 9,804-30 ft., the well flowed 102 bbl. of 38.8°-gravity oil and some water. Tubing pressure was 550 psi. The well also flowed 536,000 cu. ft. of gas with the oil. Operator will continue to test the prospective field opener.

In Goliad County, J. D. Wrather and Paul J. Fly et al have cored gas sand and run a drill-stem test at 2,834-42 ft. in their B-1 Lula Swickheimer et al, wildcat test in Cuadrilla Irrigation Co. Survey, Abstract 316, 4 miles southeast of Fannin. On the drill-stem test, the well developed 320 psi. working pressure in 15 minutes through ¼-in. chokes. Operators then drilled ahead to 3,732 ft., where the well was shut down due to icy weather. Operations have been resumed and the well will be drilled to contract depth of 5,500 ft.

Argo Oil Corp. 1 Kittie West Schreiner, gas-condensate discovery in James Wright Survey, Live Oak County, has been potentialed for 31,000,000 cu. ft. of gas per day plus 19 bbl. of 54.1°-gravity distillate per million cu. ft. Total depth of the well is 8,862 ft. and production is through perforations at 6,465-81 ft. Shut-in pressure on the well was 2,402 psi. This well extends production in Clayton field to the east.

H. C. Cockburn 1 W. D. Winn, new gas discovery in S. Castleman Survey, Abstract 12, 3½ miles south of Lane City, Wharton County, flowed 16,000,000 cu. ft. of gas per day on open flow gage. Production is from the Miocene at 4,184-88 ft. Shut-in pressure was 1,677 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Refugio County: Gas-condensate discovery—Union Oil Co. of California 1 J. J. O'Brien, Refugio Town Tract Grant, 1 mi. E Refugio townsite, TD 8,202 ft., perf. 6,402-08 ft., 975,000 cu. ft. of gas per day plus 40 bbl. of condensate, ¼-in. choke, TP 1,050 psi.

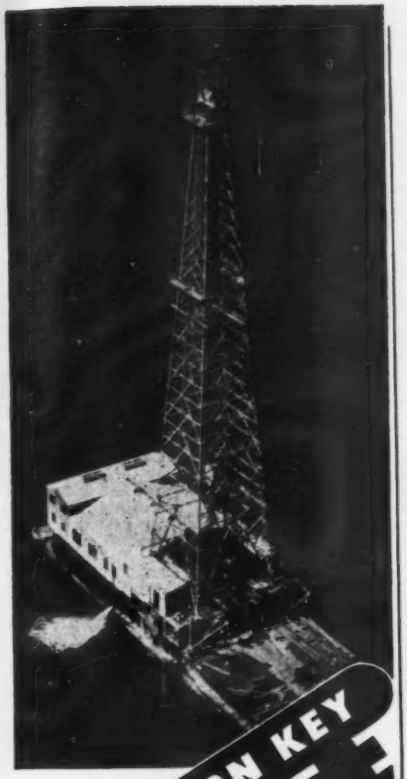
Wharton County: Gas discovery—H. C. Cockburn 1 W. D. Winn, S. Castleman Sur., A-12, 3½ mi. S Lane City, TD 5,557 ft., perf. Miocene 4,184-88 ft., 16,000,000 cu. ft. of gas per day, open flow gage, SIP 1,677 psi.

Gas discovery—Kingwood Oil Co. 2 Lacy W. Armour et al, Chas. Howard League, Abstract 181, 6 mi. S Pierce, TD 6,839 ft., perf. 5,301-08 ft. and 5,315-20 ft., 22,000,000 cu. ft. of gas per day, open flow, SIP 2,077 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Chambers County: Sparta Oil Co. 1 State of Texas M-34858, Sec. 25, Trinity-Galveston Bay, 11 mi. SW Anahuac, dry, TD 9,265 ft.

DeWitt County: Rock Hill Oil Co.-Lyons, Prestiss & McCord et al 1 Edwin Bau-



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Harris County: Jack W. Frazier 1 J. E. Price, N. B. Waters Sur., A-872, 1 mi. W Almeda, dry, TD 8,916 ft.

Jackson County: Lewis Oil Co. 3 Mrs. Regina Gayle, Nester Clay Sur., A-13, dry, TD 6,730 ft.

Karnes County: Houston Oil Co. of Texas 1 H. A. Discher, Charles Martinez Grant, A-6, 2½ mi. SW Runge field, dry, TD 6,914 ft.

Matagorda County: The Texas Co. 1 Wylie J. Butter, I&GN RR Sur., A-246, dry, TD 10,984 ft.

San Jacinto County: Commercial Petroleum & Transport Co. C-1 Coline Oil Corp., James Rankin Sur., 5 mi. SW Cold Springs, dry, TD 4,607 ft.

Victoria County: Louis J. Roussel 1 Mrs. Grace Gaffney, Juan Flores Sur., A-29, 20 mi. SW Victoria, dry, TD 4,713 ft.

Wharton County: Skelly Oil Co. 1 R. D. McCormick, GH&H RR Co. Sur. 15, A-180, and Ashmore Edwards Sur., A-94, dry, TD 9,705 ft.

Eastern Texas

Anderson County's Deep Test Drilling at 8,392 Ft.

DALLAS.—Continental Oil Co.'s 1 Frank H. Carroll, Anderson County 10,000-ft. test south of Tennessee Colony, was drilling shale and anhydrite at 8,392 ft. No shows had been reported. It logged base of the Austin at 4,395 ft., and top of the Woodbine at 4,765 ft.

M. G. Hansbro 1 Bolton, Cherokee County wildcat, ran a drill-stem test in the lower Pettit at 8,660-8,767 ft. and recovered 275 ft. of gas-cut mud in 1 hour. Drilling continued below 8,825 ft. in sand. It had top of the Pettit at 8,435 ft.

Union Producing Co. 3 Christian, shallow wildcat northeast of Ennis in Ellis County, swabbed fresh water with a scum of oil from perforations at 2,861-67 ft., and then squeezed the holes.

In Falls County, Bell Petroleum Co. 1 Leo Welch, north of Durango, had top of the Buda at 1,087 ft., and total depth at 1,112 ft. The well was producing a little salt water with a slight show of oil at last report. West of Lott, W. A. Brian and Claud Litteral 1 Masters perforated at 1,197-1,203 ft. and were waiting on orders.

In Houston County, west of Grapeland, W. D. Hinton and others 1 Walters had total depth at 6,050 ft. Perforations at 5,749-53 ft. yielded wash water with a scum of oil, then oil and salt water, on the swab. Perforations were squeezed. The section has been identified as the sub-Clarksville.

In Kaufman County, Humble Oil & Refining Co. 1 R. N. Moody, north of Elmo, had base of the Massive anhydrite at 6,575 ft., and was drilling ahead below 7,425 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Morris County: P. H. Pewitt 1 fee, J. R. Slaughter Sur., 2 mi. SE Pewitt Ranch field, dry, TD 4,856 ft., elev. 299 ft.

Rains County: B. B. Banner and Ed B. Williams 1 G. W. Alexander, Brice Miller Sur., Emory townsite, dry, TD 401 ft.

South Louisiana

Deepest Pay to Date Found at Avery Island

NEW ORLEANS.—New deep pay has been opened in Avery Island field, Iberia Parish, at Humble Oil & Refining Co. B-21 Petit Anse Co., 23-13s-5e. Through 24 casing perforations at 12,779-85 ft., the well produced 641 bbl. of 32°-gravity oil daily through 12/64-in. choke. Tubing pressure was 2,500 psi. The 9-year old field produces from four horizons between 5,400 ft. and 11,885 ft. Previous deepest production was from 11,875-85 ft. at Humble 1 Hooks, also in 23-13s-5e.

At a confirmation try in North Black Bay field, Plaquemines Parish, Gulf Refining Co. perforated at 8,958-78 ft. in its 2 State Lease 195 "QQ," Township 16s-16e, and the well came in making gas. Production was gaged at 4,910,000 cu. ft. daily, with tubing pressure of 3,250 psi. In an effort to make the well an oil producer, operator squeezed off perforations, set a plug at 7,640 ft., and perforated at 7,632-36 ft. Testing operations are now under way.

In the East Lake Verret area of Assumption Parish, Humble 1 Nickolas Kafoury, 35-1s-13e, wildcat, was dry at 12,087 ft. The well was plugged back to 11,670 ft., and drilled out to 11,750 ft. Five-inch liner was set at 11,750 ft. and perforated at 11,716-22 ft., but operator failed to establish commercial production.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Iberia Parish: New pay, Avery Island—Humble Oil & Refining Co. B-21 Petit Anse Co., 23-13s-5e, TD 12,790 ft., perf. 12,7779-85 ft., 641 bbl. oil per day, 12/64-in. choke, TP 2,500 psi., 32° gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Plaquemines Parish: Richardson & Bass 1-J Louisiana Land & Exploration Co., 39-19s-27e, dry, TD 13,052 ft.

Vermilion Parish: Humble Oil & Refining Co. 1 State Lease 1,680, Twp. 15s-3e, dry, TD 13,673 ft., PB 7,838 ft., unsuccessful, DST 7,751-53 ft.

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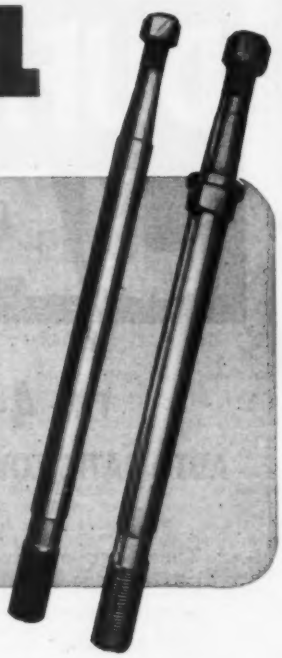

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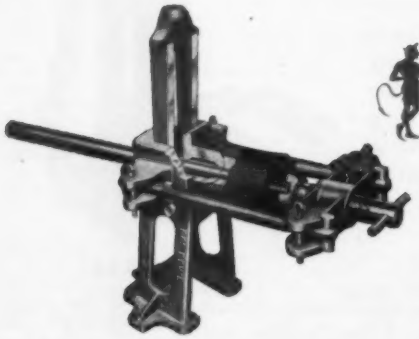

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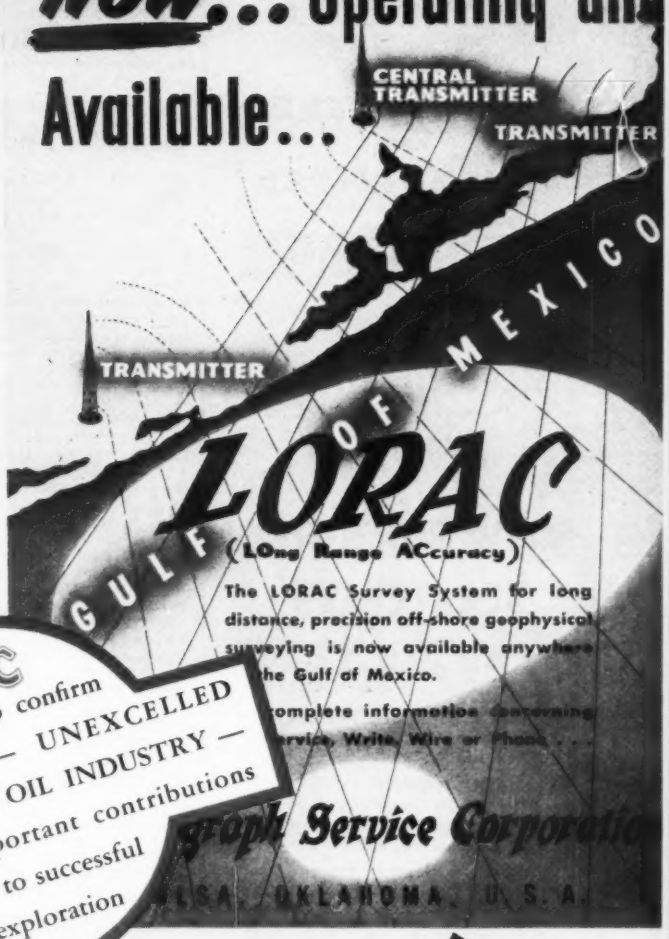

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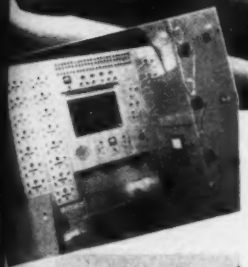

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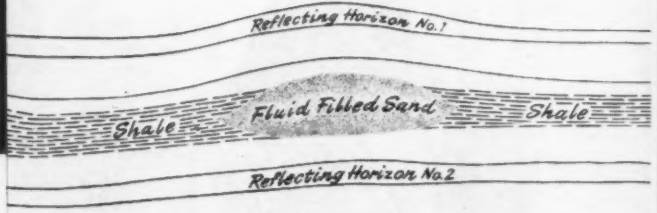

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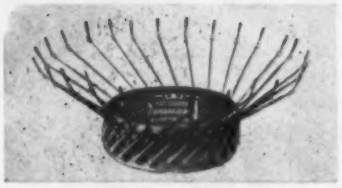

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North Central Texas

Double Mountain Field Gets Confirmation Well

WICHITA FALLS.—Seaboard Oil Co. had a second producer offsetting its Double Mountain Pennsylvanian field discovery in southwest Stonewall County. The confirmation well is 2 Sparks, south offset to the 1 Edwards, field discovery. A drill-stem test from 5,227-95 ft. recovered 210 ft. of oil and gas-cut mud and 3,575 ft. of clean oil in 3 hours. At last report the well had made a 3-hour flow of 12 bbl. an hour, through 20/64-in. tubing choke from open hole at 5,227-5,424 ft., corrected total depth. New locations were staked for west offsets to both the 1 Edwards and the 2 Sparks. Seaboard's 1 Sparks, one location east of the discovery, was reported low geologically and was slated for abandonment.

A new Bend conglomerate discovery for southwestern Jack County was in prospect at Star Oil Co. and Jack Grace Drilling Co. 1 M. E. Munson, 7 miles southeast of Bryson. The well was drilled to 4,782 ft., plugged back to 4,690 ft., and the section between 4,671-90 ft. treated with Hydrafrac. After the treatment, it kicked off and flowed 23 bbl. of oil in 14 hours through open tubing. Operators were testing to determine the best size choke. Location of the well is a north offset to an Ellenburger failure and an east offset to a 4,720-ft. dry hole.

Burns-Ragland field of northern Young County gained another pay zone at L. T. Burns 3-A Sarah Williams, which completed flowing 102 bbl. of 40°-gravity oil in 10 hours, for a calculated potential of 244 bbl. daily. Pay zone was a Strawn sand from 3,172-82 ft. The field also produces from the Caddo and the Mississippian.

In Montague County, The Texas Co. 1 Hoeldtke-Young unit, southwest outpost to Bowie Viola lime field, drilled soft lime with oil shows from 7,035-43 ft. Operators were taking a drill-stem test.

Four miles west of Hamilton in Hamilton County, Amerada Petroleum Corp. 1 McEntire reported an estimated 16,000 cu. ft. of gas daily from the Marble Falls at 3,194-3,290 ft. Recovery on the drill-stem test was 45 ft. of gas-cut mud.

Star Oil Co. 2-A Cherryhomes, south of Cundiff in eastern Jack County, ran a 5-minute drill-stem test at 5,268-90 ft. and had gas at the surface in 30 seconds, estimated at 10,000,000 cu. ft. daily. Recovery was a small amount of oil-cut mud. Twenty-minute shut-in pressure reached 1,840 psi. It was drilling ahead below 5,490 ft. in shale and sand. Location is 1,650 ft. southwest of the same firm's 1-A Cherryhomes, conglomerate discovery, which completed for 210 bbl. of oil a day from pay around 5,600 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Chas. E. Morrison 8 H. O. Prideaux, A. Rohus Sur., 3 mi. NW Markley, TD 4,230 ft., pay 4,178 ft., pumped 51.9 bbl. 42°-gravity oil a day.

Concho County: C. B. Drilling Co. 1 Walter Pfluger, A. Sator Sur., 5 mi. SW Eden, TD 2,141 ft., perf. 2,121-24 ft., flowed 102 bbl. 34°-gravity oil a day, open 2-in. tubing., GOR 200 cu. ft.

Jack County: Greenbrier Oil Co. 1 Robertson, T. J. Dunlap Sur., 10 mi. SE Bryson, TD 4,688 ft., elev. 1,166 ft., pay 4,678 ft., flowed 138 bbl. 52°-gravity oil a day, GOR 1,735 ft., TP 1,325 psi.

Young County: C. B. Christie 14 Dowda, TE&L Sur., 2½ mi. SW Proffitt, TD 2,588 ft., pay 2,578 ft., pumped 65 bbl. 42°-gravity oil a day, GOR 200 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Taylor Drilling Co. 2 A. Coffelt, Wm. Baker Sur., 5 mi. SW Archer City, dry, TD 1,261 ft.
Taylor Drilling 3 Coffelt, Wm. Baker Sur.,

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5 mi. SW Archer City, dry, TD 1,264 ft.

Callahan County: Woodley Petroleum Co. 1 First State Bank of Abilene, TEL Sur., ½ mi. N Putnam, dry, TD 1,875 ft.

Eastland County: Ormand Corp. 1 A. Tate, S. Luckerman Sur., 2½ mi. SE Pioneer, dry, TD 2,457 ft., elev. 1,640 ft., Caddo 2,430 ft.

Fisher County: Lion Oil Co. 1 Huddleston, 10-K-T&P, 6 mi. SE Longworth, dry, TD 5,941 ft., elev. 1,972 ft., Swastika 3,612 ft., Strawn 5,395 ft., Caddo 5,598 ft., Ellenburger 5,833 ft., pre-Cambrian 5,925 ft.

Grayson County: A. R. Dillard 1 W. B. McMillen, Dubose Sur., 2½ mi. SE Southmayd, dry, TD 8,182 ft. in Ellenburger, elev. 765 ft.

Howell & Howell 1 W. C. Jones, P. C. Parr Sur., 2 mi. SE Sandusky, dry, TD 5,188 ft., Strawn sand 3,626-51 ft.

Jack County: Jack Grace Drilling Co. 1 Jack Grace Ranch, C. J. C. O'Connor Sur., 13 mi. E Jacksboro, dry, TD 5,715 ft.

Jones County: Carl Hovgard 1 Maxey-Harris, 14-14-T&P, 4 mi. SE Nugent, dry, TD 2,200 ft., elev. 1,626 ft., Canyon sand 2,165 ft.

Panhandle Producing & Refining Co. 1-A E. E. West, J. W. McKissick Sur., 6 mi. SW Anson, dry, TD 3,251 ft., elev. 1,749 ft., Dothan 2,080 ft., Noodle Creek 2,190 ft., Hope 2,640 ft.

Taubert Drilling Co. 1 Anson Cemetery, OAL Sur., 1 mi. E Anson, dry, TD 3,830 ft., base Coleman Junction 1,655 ft.

Raymond Thomason 1 G. B. Steakley and C. E. Bentley, T&NO Sur., Anson townsite, dry, TD 2,827 ft. in shale.

Montague County: S. D. Johnson 1 P. J. Martin, T. Puckett Sur., 6 mi. N St. Jo, dry, TD 2,550 ft.

Stephens County: Gilchrist Drilling Co. 1 P. Swenson, OAL Sur., 6 mi. SE Breckenridge, dry, TD 3,356 ft., elev. 1,299 ft., Caddo 3,240 ft.

Chester Imes 1-B L. C. Link, 76-4-T&P, 8 mi. SE Caddo, dry, TD 1,794 ft.

Taylor County: Carl Hovgard 1 Ruthie Bigham, Guadalupe CSL, 4 mi. SW Tyre, dry, TD 3,360 ft., elev. 1,913 ft., Flippen 2,481 ft., Cook 2,531 ft., Hope 2,624 ft.

Southwest Texas

Shallow Production Found In Williamson County

CORPUS CHRISTI.—A small Serpentine discovery highlighted the activity in Southwest Texas during the week. Due to inclement weather, operations were forced down and are only now resuming drilling.

Eight miles southeast of Taylor, Williamson County, H. J. Stewart 1 Anna Rieger, wildcat in Peter Cartwright Survey, was completed in open hole in the Serpentine at 958-60 ft. and 942-44 ft. The well pumped 7 bbl. of 38°-gravity oil per day, with no water and very little gas.

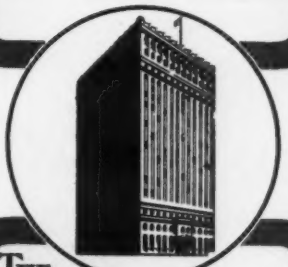
In Lacy field area of Hidalgo County, Hydrocarbon Production Co., Inc. 1 Schwarz-Ritcheson, Lot 4, Block 24, Capisallo District Subdivision, is at total depth of 7,545 ft. and operator is running 5½-in. casing to this depth. This wildcat is located approximately 1 mile south of 1 Sykes, gas-condensate producer in Lacy field.

Atlantic Refining Co. has set 5-in. liner to 9,500 ft. and is trying to regain circulation in 1 Jan S. Womack, wildcat in Cuadrilla Irrigation Co. Survey, Abstract 465, Nueces County. The well is located 4 miles east of Clara Driscoll field.

John I. Moore 1 Haby, rank wildcat in Alazan Ditch Survey, 12 miles southeast of Leaky, Real County, is drilling below 6,231 ft. in sand and shale toward a 6,700-ft. projected depth.

In San Patricio County, Quintana Petroleum Corp. 1 J. W. Hunt, wildcat in J. M.

Business in TULSA means—



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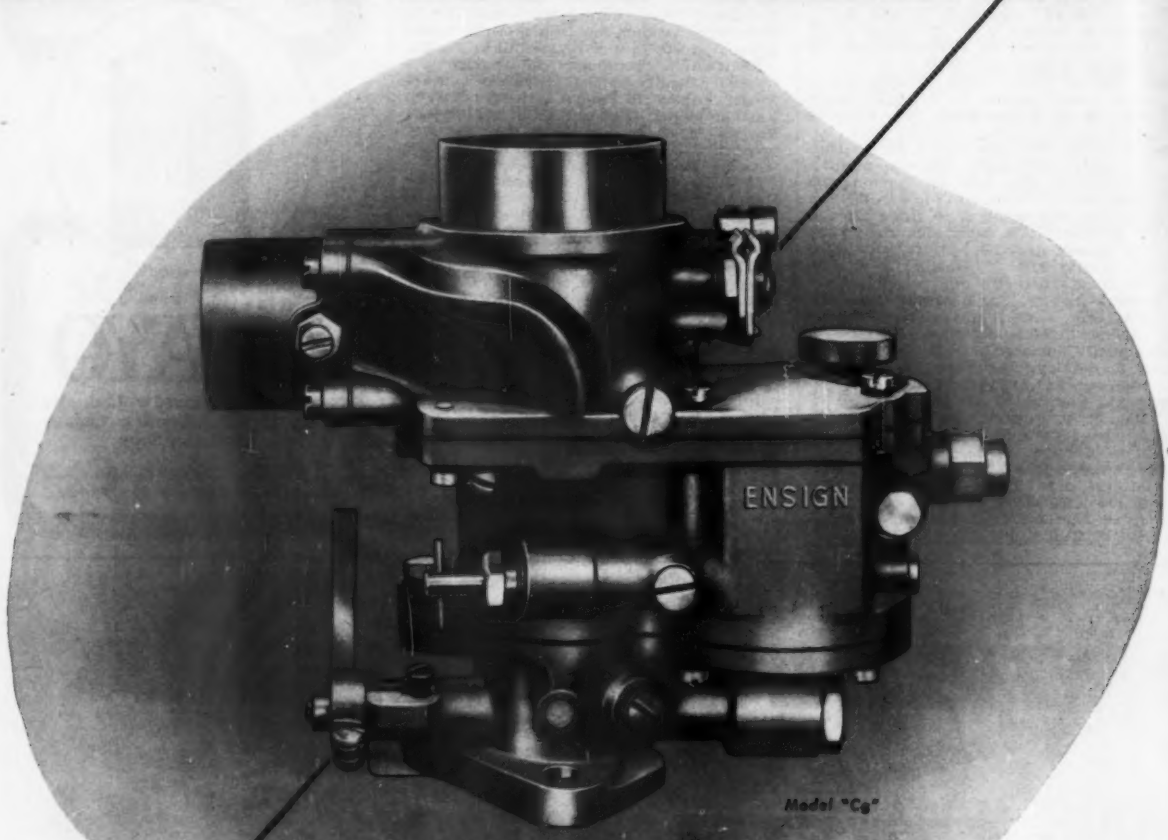

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Swisher Survey, Abstract 180, is at total depth of 9,600 ft., and at last report was running electric log. In the same county, Quintana 1 Kathleen Young Moore, wildcat, J. Orick Heirs Survey, Abstract 209, was fishing at last report. The well is bottomed at 9,260 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Jim Hogg County: Rincon Drilling Co. 1 Roy Yeager, Sur. 108, approx. 6 mi. WSW Hebbronville, dry, TD 3,174 ft.

McMullen County: Ryan, Hays, and Burke 1 George Sealy est., Juan I. Diaz Sur. 41, approx. 1 mi. NW Dilworth field, dry, TD 6,012 ft.

Milam County: J. D. Stubblefield 2 R. F. Lindhorst, J. J. Acosta Sur., 13 mi. SW Buckholts, dry, TD 1,600 ft.

Appalachian-Ohio

One of Nation's Largest Gas Wells Completed

PITTSBURGH.—The largest gas well east of the Mississippi River was struck in the Leidy Township, Clinton County area of Pennsylvania. New York State Natural Gas Corp. N-194 H. E. Finnefrock, elevation 1,753 ft., on the Tamarack Quadrangle, gaged over 125,000,000 cu. ft. of gas with a rock pressure of 3,650 psi. in 18 hours. When the gas was struck, the tools were blown out of the hole into a considerable distance in the air and damaged the crown block. The Onondaga lime was logged at 6,319 ft., Oriskany sand at 6,335 ft. with gas, and total depth is 6,336 ft. The well has been successfully shut in. No other completions or locations were reported in this area.

Maryland.—In the Mountain Lake Park section of Garrett County, Eberly & Snee 1 E. O. O'Donnell is shut down at 3,522 ft. and is being acidized. The gas in the chert originally testing 343,000 cu. ft. now tests 700,000 cu. ft.

West Virginia.—In Union district, Jackson County, Vail Gas Co. 2 W. T. Wright was completed gaging 12,530,000 cu. ft. of gas, natural, in the brown shale at 3,591-3,682 ft. with total depth at 3,682 ft. In Triadelphia district, Logan County, United Producing Co., Inc. 6-1743 Buffalo Creek Coal & Coke Co. tested 2,011,000 cu. ft. of gas in the Maxton sand; total depth is 2,185 ft. In Lee district, Mingo County, R. M. Kolze, Trustee, 3 Williamson Mining & Manufacturing Co. tested 1,050,000 cu. ft. of gas in the brown shale; total depth is 2,902 ft. In the Limestone Hill area, Steele district, Wood County, a successful wildcat was completed: United Fuel Gas Co. 6651 Ralph Ayers tested 2,659,000 cu. ft. of gas, after shot (see details below).

WEST VIRGINIA SUCCESSFUL WILDCAT

Wood County, Steele district: United Fuel Gas Co. 6651 Ralph Ayers, elev. 951 ft., 2,659,000 cu. ft. of gas, after shot, rock pressure 410 psi. in 15 hours, Corniferous lime 5,052 ft., Oriskany sand 5,205 ft., gas 5,219-35 ft., TD 5,237 ft.

OHIO

COLUMBUS.—W. H. Patton's 5 C. R. Steiner, Section 21, Jefferson Township, Knox County, was drilled through the Clinton sand at 3,020-42 ft. with a good showing of oil. After shooting with 160 qt., the well made 62 bbl. in 24 hours. The same operator is attempting to extend the pool ½ mile to the southwest with a test on E. P. Greer, Section 2.

L. L. Dittoe et al. completed a small well as an outside location on Mary Walser, Section 27, Hopewell Township, Perry County. The Clinton, at 2,922-53 ft., had a fairly good showing and made 25 bbl. the first day after an 80-qt. shot.

Drilling was at a standstill for a week

1895 1st of Tulsa 1951

STATEMENT OF CONDITION

December 30, 1950

RESOURCES

Cash and Due from Banks	$72,276,986.79	
U. S. Government Securities	59,507,444.44	$131,784,431.23
Other Bonds and Securities		9,652,742.55
Loans and Discounts		68,012,551.48
Federal Reserve Bank Stock		240,000.00
Income Earned, Not Collected		512,408.67
Bank Premises		1.00
Furniture and Fixtures		736,147.30
Customers' Liability Under Letters of Credit		13,030,026.58
Other Resources		20,376.71
		$223,988,685.52

LIABILITIES

Deposits		$199,232,557.23
Income Collected, Not Earned		322,222.47
Taxes Interest and Expense—Accrued		584,397.95
Letters of Credit Outstanding		13,030,026.58
Capital	$3,000,000.00	
Surplus	5,000,000.00	
Undivided Profits	2,819,481.29	10,819,481.29
		$223,988,685.52

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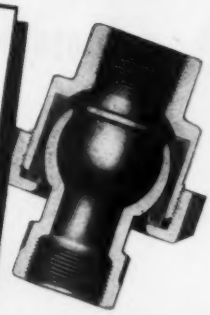

Barco Flexible Ball Joint, Style 7-8—one of many different styles.

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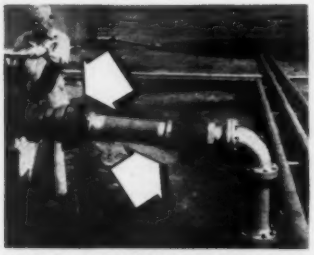

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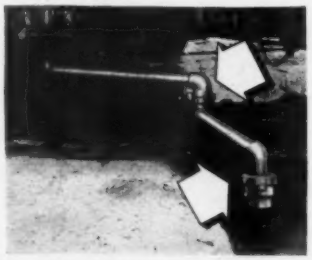

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due to extreme cold weather and heavy snows, but 12 locations scattered over 10 countries were reported.

Kansas

Pawnee County Wildcat Makes Lansing Producer

STANOLIND OIL & GAS CO. 1 Evers, NE NW NE 1-22-16, a rank wildcat located 3 miles east of Larned in eastern Pawnee County, has been completed as a small producer in the Lansing-Kansas City lime section. Plugged back from the Arbuckle lime where it also had tested for a possible small well, and with casing perforated at 3,525-31 ft. in the shallower horizon, it made 58 bbl. net oil with 47 bbl. of water per day on pumping potential tests. Tests followed an initial injection of 2,000 gal. of acid into the producing zone.

When testing the Arbuckle lime, opposite which zone casing was perforated at 3,942-43 ft., the well flowed initially at the rate of 6 bbl. of oil per hour but the flow quickly dropped. Hole had been drilled to 3,972 ft., where casing was run. Top of the Lansing is 3,488 ft. (—1,510 ft.), and Arbuckle 3,914 ft. (—1,936 ft.). Nearest other oil production is in the Ash Creek pool, 5 miles to the north. There is some small gas production 2 miles to the south in the Torrance pool.

Testing continues at Stanolind Oil & Gas Co.'s rank wildcat, 1 Wall, C NE SE 35-32-23, near Ashland, in Clark County, in the southwestern part of the state, where opening of production from Viola lime is in prospect. Since testing a zone at 6,580-86 ft., a plug has been set above this zone at 6,550 ft. and casing perforated opposite a higher interval at 6,526-36 ft. in the same formation. In an initial 4-hour test, the well swabbed and flowed 14 bbl. of oil and 2 bbl. of water per hour. After injection of 2,000 gal. of acid, the well flowed 11 bbl. of oil per hour for 6 hours without water. An additional 4,000 gal. of acid was injected, and the well flowed 10 bbl. of oil and 1½ bbl. of water per hour for 4 hours. This is the first prospective production ever found below the Mississippian anywhere in southwestern Kansas. The well is more than 20 miles from any other production.

E. H. Adair 1 Argo-Eveleigh, SE SE NW 31-17-12, Barton County, has been given a potential rating or 240 bbl. of oil per day to open the Northwest Redwing pool. Production is from Arbuckle lime, topped at 3,319 ft. (—1,499 ft.). Total depth is 3,331 ft. Location is about ¾ mile northwest of the Redwing pool.

Another discovery well, The Texas Co. 1 Reidel, SW NE SE 31-13-19, ¾ mile north of the Irvin pool, Ellis County, pumped 188 bbl. in 24 hours on potential tests. It also produced from Arbuckle lime, topped at 3,905 ft. (—1,631 ft.), and drilled to 3,910 ft.

KANSAS SUCCESSFUL WILDCATS

Graham County: Deep Rock 1 Moore, SE SE SE 20-8s-22w, pumped 209 bbl. oil per day from 3,616-39 ft., TD 3,895 ft. Topeka 3,191 ft., Heebner 3,418 ft., Toronto 3,441 ft., Lansing-Kansas City 3,455 ft., Sooy 3,813 ft., erosional Arbuckle 3,859 ft.

Rooks County: Lohmann-Johnson 1 Schontholer, NE NE NW 31-10s-19w, pumped 169 bbl. oil per day from Lansing at 3,480-90 ft., TD 3,768 ft., Heebner 3,406 ft., Dodge 3,419 ft., Sooy 3,675 ft., Simpson 3,123 ft., Arbuckle 3,759 ft.

Sumner County: Texas Pacific 1 Metz, NE NE NW 7-32s-2e, flowed 147 bbl. oil per day from Arbuckle at 3,773-77 ft., TD; Topeka 1,700 ft., Stalnaker 2,475 ft., Kansas City 2,825 ft., Mississippi chat 3,416 ft., Simpson sand 3,731 ft.

Woodson County: Barker-Ashlock 1 Hitching, SW SE NW 36-23s-14e, pumped 5 bbl. oil per day from 1,635-50 ft., TD; Mississippi lime 1,625 ft.

A New Instrument

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KANSAS WILDCAT FAILURES

Barton County: Hyde-Stormfeltz 1 Siegfried, SE SE NE 28-16s-14w, dry, TD 3,425 ft., anhydrite 904 ft., Topeka 2,851 ft., Heebner 3,083 ft., lime 3,149 ft., Lansing-Kansas City 3,163 ft., Sooy 3,366 ft., Arbuckle 3,390 ft.

Butler County: National Associated Petroleum 1 Brandt, NE SE SW 33-28s-7e, dry, TD 2,815 ft., Kansas City 2,093 ft., Marmaton 2,286 ft., Ft. Scott 2,481 ft., Cherokee 2,553 ft., Mississippi lime 2,807 ft.

Rex & Morris 1 Penner, SE NE NE 18-23s-5e, dry, TD 2,661 ft., Mississippi chat 2,406 ft.

Ellis County: Armer-N. C. R. A. 1 Miller, SE SE SW 29-12s-16w, dry, TD 3,610 ft., Heebner 3,223 ft., Toronto 3,242 ft., Lansing-Kansas City 3,263 ft., Sooy 3,533 ft., Arbuckle 3,589 ft.

Graham County: Barnett 1 Rice, SW SW SW 3-10s-22w, dry, TD 4,120 ft., anhydrite 1,850 ft., Topeka 3,342 ft., Heebner 3,569 ft., Lansing-Kansas City 3,608 ft., Sooy 3,975 ft., Arbuckle 4,077 ft.

Phillips County: Honaker 1 Hector, SW SE SW 7-1s-18w, dry, TD 3,490 ft., Heebner 3,331 ft., Lansing-Kansas City 3,356 ft.

Reno County: Wakefield 1 Bogner, SE SE SE 14-26s-4w, dry, TD 3,760 ft., Lansing-Kansas City 2,925 ft., Mississippi lime 3,706 ft.

Riley County: Brack 1 Johnson, SW SW SE 33-7s-5e, dry, TD 2,610 ft., Topeka 1,145 ft., Lansing-Kansas City 1,466 ft., Marmaton 1,755 ft., no Cherokee or Mississippi lime, Kinderhook 1,875 ft., Hunton 2,068 ft., Maquoketa 2,510 ft., Viola 2,584 ft.

Brack 1 Erickson, NE NE NW 15-7s-5e, dry, TD 2,561 ft., Topeka 980 ft., Lansing-Kansas City 1,280 ft., Kinderhook 1,720 ft., Hunton 1,776 ft., Maquoketa 2,220 ft., Viola 2,283 ft., Decorah 2,420 ft., Simpson 2,445 ft., St. Peter 2,508 ft., pre-Cambrian 2,550 ft.

Saline County: Sheldon 1 Holmquist, SE SE SE 20-15s-3w, dry, TD 3,421 ft., Mississippi lime 2,772 ft., Kinderhook 3,106 ft., Misener 3,240 ft., Hunton 3,246 ft., Maquoketa 3,264 ft., dolomite 3,325 ft., lime 3,383 ft.

Sumner County: Robinson 1 Worden, NW SW NW 10-32s-1w, dry, TD 3,720 ft., Lansing-Kansas City 3,020 (?) ft., Mississippi chat 3,680 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Harlan County: Merces & Galloway 1 Drake, NW NW NW 35-1n-18w, dry, TD 3,369 ft., Heebner 3,228 ft., Lansing-Kansas City 3,259 ft.

Michigan

Midland County Wildcat Logs Dundee Prospect

MOUNT PLEASANT. — Michigan Oil Co. may have a new Dundee lime oil discovery well at its a State-Jerome, NW SW NE 13-15n-1w, Jerome Township, Midland County. The wildcat logged objective Dundee top at 3,683 ft. and first oil pay at 3,753-59 ft. At this point, hole filled 100 ft. with oil in 1 hour and 200 ft. overnight. Deepened from 3,760 to 3,766 ft., a possible increase in gas was logged but there did not appear to be an increase in oil pay. The hole, after being bailed dry, again showed 150 ft. of free oil in 2 hours. Operators were preparing to set 5-in. casing in the top of the Dundee and acidize this show before making any further decisions regarding deepening.

The new Jerome Township oil-showing wildcat is located about 5 miles east and 2 miles south of Jerome Dundee oil pool in the same township, and in many respects this new strike appears to be comparable with this other pool, although it is showing from a lower structure.

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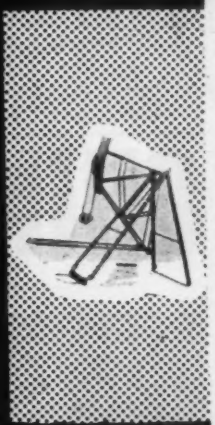

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The 1 State-Jerome test checks in about 13 ft. lower on the Dundee than a dry hole correlation point located about 3 miles to the west; about 36 ft. higher than another point located ½ mile to the east.

W. B. Darke's 1 Bergelin, Wheatland Township wildcat, Mecosta County, was drilled out dry in the Dundee at 3,809 ft., total depth, but operations were started to plug back and test a Traverse oil show, which showed about 300 ft. of free oil in 10 hours at 3,307-11 ft. This shallower oil show will be acidized. Dundee top was logged at 3,803 ft. and Traverse lime top was picked at 3,258 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: Sheldon-Stewart Co. 1 Clark & Fry, NE SW SE 31-2n-13w, Traverse 1,321 ft., dry, TD 1,329 ft.

Kent County, Byron Township: Universal Drilling Co. 1 Sullivan, SW SW NW 2-5n-12w, Traverse 1,524 ft., dry, TD 1,829 ft.

Montcalm County, Pine Township: William W. Mesel 1 Christensen, SE SE SE 18-11n-8w, dry in Michigan stray, TD 1,357 ft.

Oklahoma

Roulette Creek Pool Gets Third Good Well

FURTHER indication of the productive potentialities of the Roulette Creek pool, eastern Cleveland County, rated as one of the most important discoveries of the past year, has been given with the completion of the third good well. It is Herman Brown 1 Evans, NW NW SW 15-8n-1e, southeast diagonal 40-acre offset to the discovery well. The well flowed 116½ bbl. of oil during a 14-hour production test with flow restricted to ¼-in. choke. Total depth is 6,486 ft. with the pool's Wilcox pay open below 6,471 ft., where casing was cemented.

In the meantime, Southern Production Co. and Greenbrier Oil Co. are drilling ahead in their 1 Dover, E½ SW SW 28-8n-3w, north offset to the discovery well and first confirmation test for the North Washington pool, northeastern McClain County, is drilling ahead below the Bromide sand after finding additional prospects of good production in that section. Three drill-stem tests at different levels were made in the above section. The first, taking in an interval at 10,665-700 ft. at the top of the section (top 10,699 ft.), flowed oil intermittently during the test and got a recovery of 2,500 ft. of free oil and 150 ft. of heavily oil-cut mud in the pipe breakdown. Tester was open 1 hour.

The second test took in an interval at 10,711-25 ft. and lasted 34 minutes. In it, gas started flowing within 8 minutes and clean oil in 32 minutes. Bottom-hole flowing pressure ranged from 3,000 to 3,800 psi. Shut in, the pressure built up to 4,450 psi. in 20 minutes. The third test, taking in an interval at 10,736-55 ft., apparently found the water level for that section as pipe recovery included more than 3,500 ft. of oil and gas-cut salt water with 270 ft. of oil and gas-cut mud.

The discovery well, completed last August in the Bromide section, also found good prospects of production in lower horizons, which will be explored by the present confirmation test before it is completed.

Sun Oil Co. has completed another good Springer sand producer at the southeastern tip of the Velma southeastward extension play. Its 5 Robison, NE NE SE 3-2s-4w, flowed 1,761 bbl. of clean 32° oil in 24 hours through casing and a 2-in. flow line. With flow restricted to ½-in., it produced more than 90 bbl. of oil during a 4-hour period, with tubing flow pressure of 120 psi. Then, through ⅜-in. choke, it made 161½ bbl. in 1 hour.

Frank Buttram has opened a new Earlsboro sand pool near the Trousdale townsite in Pottawatomie County, where his 1 State, SE SE NE 36-7n-2e, pumped 25 bbl. of oil per day following a 30-qt. shot. Sand is at 4,315-27 ft.

Encouraging showings have been encountered by W. A. Delaney, Jr., in his 1 Newton, C SE SW 17-11n-23w, a rank wildcat southwest of Berlin, near the Beckham County line in southern Roger Mills County. A 2-hour drill-stem test in granite wash at 9,157-9,212 ft. resulted in a recovery of 280 ft. of slightly gas-cut mud with an oil rainbow, and 210 ft. of heavily oil-cut mud (10 per cent 40° oil). Flow pressure was 350 ft. Hole is drilling ahead. The location is 12 miles northwest of the west end of the Elk City pool, nearest production.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Cities Service and Ohio Oil Co. 1 Hatcher, NW NW NE 29-4n-1w, flowed 261 bbl. 40.8°-gravity oil per day from second bromide at 4,674-82 ft., TD 4,740 ft., basal Pontotoc 2,795 ft., Lansing-Kansas City 3,520 ft., Avant-Dewey 4,060 ft., Hogshooter 4,325 ft., Layton 4,418 ft., basal Pennsylvanian-Simpson 4,524 ft., first bromide sand 4,591 ft. and 4,614 ft.

Logan County: Trigg Drilling Co. 1 Pollard, NE NE SE 6-18n-4w, flowed 2 bbl. distillate and 1,000,000 cu. ft. gas per day from lower Layton at 4,674-86 ft., TD 6,390 ft., Oread 3,602 ft., Tonkawa 4,009 ft., Avant 4,313 ft., upper Layton 4,611 ft., Mississippi lime 5,643 ft., Woodford 4,863 ft., Sylvan 5,974 ft., Viola 6,045 ft., Wilcox 6,232 ft., second Wilcox 6,368 ft.

Payne County: T. N. Berry Co. 2 Ross, SE SE NW 25-18n-4e, open flow of 2,659,000 cu. ft. gas per day from Bartlesville at 3,550-76 ft., TD 3,640 ft., Layton 1,932 ft., Osage Layton 1,998 ft., Hogshooter 2,338

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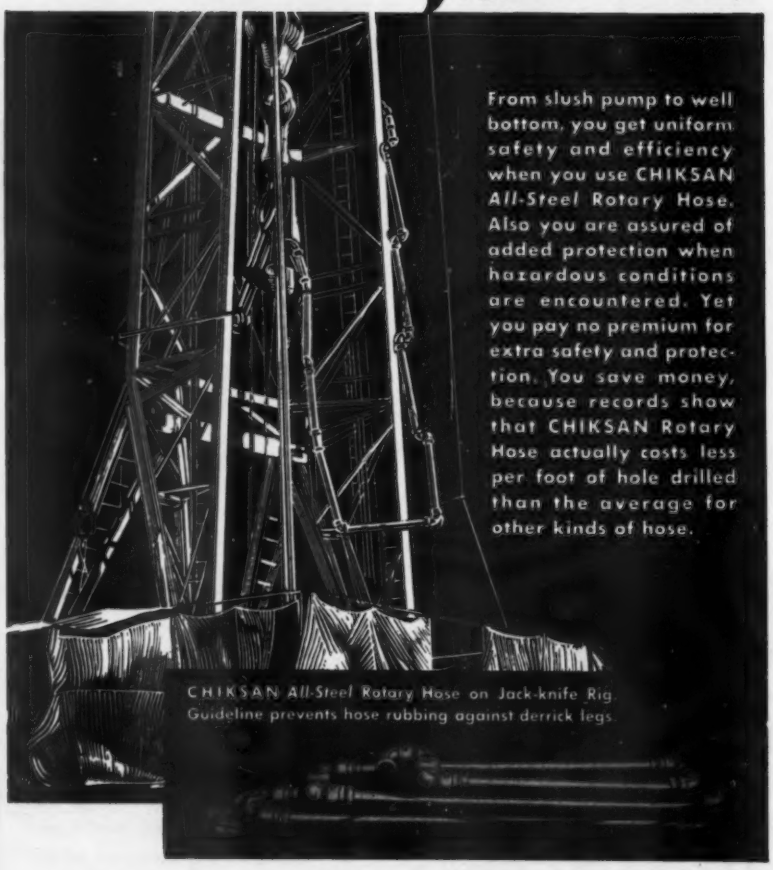

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ft., Checkerboard 2,658 ft., Big lime 3,065 ft., Oswego 3,110 ft., Prue 3,200 ft.

Pottawatomie County: Barrett & Musgrave 1 Guderian, SE NE NW 12-10n-4e, pumped 365 bbl. 37°-gravity oil per day from Wilcox at 4,837-65 ft., TD; Belle City 1,990 ft., Perry gas sand 2,093 ft., Hogshooter 2,430 ft., Checkerboard 2,916 ft., conglomerate 3,076 ft., Oswego 3,625 ft., Prue 3,655 ft., Skinner 3,788 ft., Earlsboro 3,986 ft., Inola 4,120 ft., Mayes 4,415 ft., Woodford 4,550 ft., Sylvan 4,665 ft., Viola 4,759 ft., dense 4,795 ft., dolomite 4,815 ft.

OKLAHOMA WILDCAT FAILURES

Comanche County: King et al 1 Weaver, NE SW SE 19-4n-10w, dry, TD 2,040 ft., basal Permian-Springer 1,932 ft.

Cotton County: Halliburton 1 Komah, SE SE SE 1-1s-10w, dry, TD 2,512 ft., Keys sand 2,244 ft., Zipsie 2,470 ft.

Creek County: Johnson & Gill et al 1 Randle, NW NW NW 13-14n-7e, dry, TD 3,974 ft., Hogshooter 1,220 ft., Layton 1,340 ft., Checkerboard 1,610 ft., conglomerate 1,695 ft., conglomerate sand 1,695 ft. and 1,735 ft., Oswego 2,595 ft., Skinner 2,685 ft., no Red Fork, Inola 3,016 ft., Bartlesville 3,020 ft., Dutcher 3,380 ft., Mayes 3,550 ft., Woodford 3,628 ft., Sylvan 3,818 ft., Viola 3,882 ft., no first Wilcox, second Wilcox 3,953 ft.

Delta Petroleum Corp. 1 Hopping Investment Co., NW SE NE 2-19n-8e, dry, TD 2,986 ft., Burgess 2,675 ft., Mississippi lime 2,719 ft., chert 2,870 ft., Mississippi lime 2,873 ft., Woodford 2,930 ft., Wilcox 2,969 ft.

Garvin County: Carlock & Burke 1 Butterly, SE SE SE 22-1n-1e, dry, TD 4,323 ft., basal Pontotoc-Hoxbar 3,345 ft., sand 3,400 ft.

Jefferson County: Christie et al 1 Little, SE NW NW 27-3s-5w, dry, TD 2,287 ft., Hoxbar 965 ft., lime 1,193 ft. and 1,437 ft., Arbuckle 2,110 ft.

McCasland 1 Dillard, SE NE NE 30-5s-7w, dry, TD 3,950 ft., strat test.

(Continued on page 162)

Permian Basin

Deep Rework Job Tests Spraberry

MIDLAND.—Gulf Oil Corp. 1-E-B G. W. Glass, reworked wildcat in southwestern Martin County, found the Ellenburger dry in drilling to 12,915 ft., and plugged back to test the Spraberry. Following Hydrafrac treatment from 8,720-80 ft., the well flowed 132 bbl. of oil plus 6 bbl. of sediment in 24 hours through various chokes from ¼-¾-in., and of the total yield some 87 bbl. was new oil and the balance load oil. Gravity of the oil was 36°. The well developed water in the Ellenburger and a small amount of oil from the Pennsylvanian.

Gulf's 2-E-B Glass, ½ mile north of the above well, prepared to drill-stem test. A test in the Pennsylvanian at 10,412-521 ft. developed 54 bbl. of 46°-gravity oil, with no water, in 4½ hours. Total depth was 10,582 ft.

Pan American Production Co. 1 Breedlove, northwest of Tarzan in Martin County, recovered 120 ft. of slightly gas-cut mud on a test from 8,176-8,265 ft., apparently in the Spraberry. Drilling continued.

Another Spraberry discovery for Upton County was in prospect at Ted Weiner 1-17 Walter Braden, about 8½ miles south of his recent Driver field discovery (Midland County). The Braden test indicated shows of oil, or saturation, from 6,985-7,015 ft., 7,040-70 ft., 7,100-34 ft., and 7,134-80 ft. A 4½-hour drill-stem test from 7,091-80 ft. recovered 480 ft. of clean oil with no water. Operators prepared to treat with Hydrafrac in open hole from 7,000-7,180 ft. and continue testing.

According to reports, the pay section in the Braden well is the same as in the 1-16 Driver, Midland discovery. Top of the Spraberry in the Braden was 6,980 ft., or minus 4,265 ft., which was said to be 124 ft high to the 1-16 Driver, and 285 ft. high to Humble Oil & Refining Co.'s 1 Midkiff. The latter well was a Midland discovery, 6 miles northwest of the 1-17 Braden.

Hiawatha Oil & Gas Co. has completed its Schleicher County Pennsylvanian discovery for a flowing potential of 471 bbl. daily, based on a 10-hour gage through ¼-in. choke. Drilling reports carried the pay sections as Canyon reef, perforated from 5,612-20 ft., and open hole in the Strawn from 5,624-75 ft., total depth. On the test, gas-oil ratio was 1,800 cu. ft., gravity was 40°, and flowing tubing pressure was 1,550 psi. The well was later held to 128 bbl. of oil a day, flowing through 3/16-in. choke. Nearest production is the Hulldale Strawn discovery, about 3 miles to the southwest. Hiawatha and G. W. Strake, Houston, hold north and east offset locations, Sinclair Oil & Gas Co. has a south offset, and Ohio Oil Co. a southwest offset location.

In southeastern Midland County, about midway between Midkiff and Driver Spraberry fields, Magnolia Petroleum Co. 1 Sam R. Preston had top of the Spraberry sand at 7,113 ft., (minus 4,376 ft.). The top was 23 ft. high to Weiner's 1-16 Driver to the southeast and 158 ft. high to the Midkiff discovery to the southwest. A core from 7,100-30 ft. recovered 13 ft. of shale and 17 ft. of Spraberry sand having good oil odor and shows. Core from 7,130-35 ft. recovered 5 ft. of sand and shale, with oil shows in the sand. Operators were coring ahead from 7,135 ft., and had planned to core to 7,150 ft. then run a drill-stem test. The project was originally scheduled to 13,000 ft. as an Ellenburger exploration.

Northeast of Post in Garza County, Continental Oil Co. 2 Swenson Land & Cattle Co., Canyon reef discovery, was scheduled for completion on pump after swabbing 120 bbl. of 30°-gravity oil in 24 hours. Perforations were from 6,855-95 ft.

Cities Service and Continental 1-AH University, Ellenburger discovery south of Benedum field, apparently had the water shut off on its last reported test to 10,776

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THE OIL AND GAS JOURNAL

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ft. In 11 hours, flowing through 20/64-in. choke, the well made 165.6 bbl. of distillate, cut with approximately 1 per cent sediment and water.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crane County: Humble Oil & Refining Co. 1 Hallie C. Day, 15-X-CCSD&RGNG Sur., 5 mi. SW Crane, TD 8,651 ft., elev. 2,565 ft., Devonian 7,596 ft., pay 8,606 ft., flowed 110.86 bbl. 43°-gravity oil a day, 16/64-in. choke, GOR 885 cu. ft., TP 140 psi.

Dawson County: Sunray Oil Corp. 1 Robert Brown, 3-35-4N-T&P, 9 mi. SE Lamesa, TD 9,538 ft., elev. 2,898 ft., perf. 9,496-9,524 ft., flowed 302 bbl. 42°-gravity oil a day, 24/64-in. choke, GOR 313 cu. ft., TP 165 psi.

Ector County: Texas Gulf Producing Co. 2 Woodward, 3-45-2S-T&P, 7 mi. S Notrees, TD 6,300 ft., elev. 3,134 ft., Tubb pay 6,080 ft., pumped 148 bbl. 38°-gravity oil a day, GOR 420 cu. ft.

Glasscock County: Trinity Production Co. 1 Wrage, 20-36-3S-T&P, 25 mi. SE Midland, dry, TD 7,010 ft., elev. 2,571 ft., Spraberry 6,900 ft., flowed 279 bbl. 38°-gravity oil a day, 28/64-in. choke, GOR 670 cu. ft., TP 100 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Coke County: Mar-Tex Realization Corp. 1 Nora Gee, 119-2-H&TC, 12 mi. SW Silver, dry, TD 8,113 ft., elev. 2,538 ft., Ellenburger 7,926 ft.

Union Oil Co. of California 1 City of Robert Lee, J. W. Hall Sur., 1 mi. E Robert Lee, dry, TD 5,370 ft., elev. 1,885 ft., Flippen 3,540 ft., Swastika 3,890 ft., McCutchin 3,990 ft., Home Creek 4,410 ft.

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Crane County: Humble Oil & Refining Co. 2 J. M. Cowden, 61-X-CCSD&RGNG Sur., 9 mi. W Crane, dry, TD 9,184 ft., elev. 2,440 ft., Glorietta 3,750 ft., Woodford 6,325 ft., Devonian 6,510 ft., Silurian 7,530 ft., Montoya 7,690 ft., Simpson 7,900 ft., Waddell 8,525 ft., Ellenburger 9,025 ft.

Crockett County: Moore Exploration Co. 1 Noelke Livestock Co., 20-GG-HE&WT, 15 mi. SE Iran, dry, TD 7,084 ft., elev. 2,475 ft., San Andres 2,020 ft., Ellenburger 6,790 ft.

Ector County: Deep Rock Oil Corp. 1 J. L. Johnson, 29-43-1S-T&P, 10 mi. NW Odessa, dry, TD 5,905 ft., elev. 3,040 ft., San Andres 4,367 ft., Glorietta 5,446 ft.

J. K. Dobbs 1 J. L. Johnson, 43-43-1S-T&P, 12 mi. W Odessa, dry, TD 6,500 ft.

Glasscock County: R. R. Herrell 1 Marshall Cook, 5-34-4S-T&P, 4 mi. W Garden City, dry, TD 10,962 ft., elev. 2,696 ft., San Andres 2,750 ft., Spraberry 5,985 ft., Wolfcamp 8,300 ft., Strawn 9,738 ft., Devonian 10,315 ft., Fusselman 10,678 ft., Ellenburger 10,754 ft.

McCulloch County: Frederick Oil Co. 1 M. Shelton, H&TC Sur., 8 mi. NW Brady, dry, TD 1,557 ft.

Pecos County: McElroy Ranch Co. 1 J. H. Tippett, 65-194-GC&SF, 10 mi. NW Iraan, dry, TD 1,737 ft.

Hal C. Peck 1 Golden, 92-10-H&GN, 2½ mi. S Buena Vista, dry, TD 2,185 ft.

R. K. H. Oil Co. 1 J. W. Grant est., 18-10-H&GN, 6 mi. SW Imperial, dry, TD 1,440 ft.

Runnels County: Arthel Henson 1 R. H. Herring, H. C. Wylie Sur., 7 mi. NW Ballinger, dry, TD 4,370 ft., elev. 1,719 ft., King 2,462 ft., Gunsight 2,718 ft., Palo Pinto 3,612 ft., Morris 3,805 ft., Caddo 4,207 ft.

C. E. Hyde 1 J. J. Fuchs, H. H. Howard Sur., 8 mi. S Ballinger, dry, TD 4,354 ft., elev. 1,730 ft., Palo Pinto 3,200 ft.

Scurry County: V. A. Brill 1 Josephine Woodard, 443-97-H&TC, 9 mi. N Snyder, dry, TD 7,495 ft., elev. 2,355 ft., Reef 6,980 ft., Strawn B zone 7,294 ft., C zone 7,472 ft.

Terry County: Ryan, Hays & Burke 1 Hulme, 8-D12-C&M Sur., 2 mi. N Gomez, dry, TD 10,972 ft., elev. 3,380 ft., San Andres 4,838 ft., Spraberry 7,593 ft., Dean 9,280 ft.

Tom Green County: W. W. Meeker 1 W. A. West, 50-25-H&TC, 10 mi. SE Christoval, dry, TD 6,000 ft., elev. 2,326 ft., Ellenburger 5,745 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Magnolia Petroleum Co. 1 Jackson-State, northeast offset to its 1-B O'Brien, Devonian discovery, tested salt water in the transition zone between the Permian and the Pennsylvanian. The 4-hour test, from 6,706-24 ft. had gas in 3 minutes and flowed water in 1 hour and 45 minutes.

Magnolia has scheduled a 10,000-ft. wildcat for northern Lea County, 7 miles west of Ranger Lake and about 8 miles north of the Bagley area. The project is the 1 Four Lake unit estate, in 15-10s-34e.

McAlester Fuel Co. 1 Simpson, wildcat in 26-12s-37e, topped the Mississippian at 11,480 ft. on elevation of 3,899 ft., and was drilling ahead below 11,803 ft. Drill-stem test at 9,775-9,810 ft. recovered gas-cut sulfur water.

In the northwestern corner of Lea County, H. S. Moss 1 State, 32-11s-33e, was drilling shale at 7,600 ft. It had the San Andres at 3,740 ft. on elevation of 4,302 ft. The wildcat is looking for the Devonian.

Sharples Oil Co. 1 Seth Alston, a deepening operation 8 miles southwest of Tatum, had progressed below 9,991 ft. in shale and lime at last report. Previous total depth was 5,127 ft. On elevation of 4,115 ft., it had the San Andres at 4,370 ft., Abo at 7,840 ft. and the Hueco section at 9,500 ft.

Stanolind Oil & Gas Co. 2 Federal-Leonard, wildcat in 12-26s-27e, shot with nitro between 9,170-9,900 ft. and swabbed 50 bbl. of oil in 3 hours. Operators were to acidize and test.

Illinois-Ind.-Ky.

Production Indicated in Two Illinois Wildcats

WILDCATTING along the east side of the Clay City-Noble Consolidated pool stretching through three counties in Illinois has uncovered indications of two more pools, one near the central portion in Richland County, and the other near the southern end in Wayne County, during the past week.

In the former county, Joe Bander and Toler Drilling Co. 2 Nina Diesser, NE NE NW 1-3n-9e, 3 miles west of Olney and a mile east of production, got a good gas and oil flow during a drill-stem test of saturation found in the Rosiclare and McClosky zones. Interval tested was at 2,973-95 ft. Tester was open 60 minutes. Gas was at the top within 20 minutes and oil within 42 minutes. Hole was carried to 3,030 ft. before running casing, which was cemented on top the Rosiclare.

In Wayne County, J. W. Rudy 1 Denny-Bunting, NW SE NW 32-1n-9e, 2½ miles south of Mt. Erie, and about 2 miles east of production, is a prospective producer from the Aux Vases sand, logged at 3,219-29 ft. A drill-stem test with tool open 60 minutes flowed gas within 8 minutes and yielded 1,450 ft. of clean oil and 30 ft. of oil-cut mud in the pipe breakdown. Bottom of the hole still in saturated sand. Casing has been run to the top of the pay for completion.

Discovery last September of the Bartelso East pool in southern Clinton County, Illinois, is being confirmed with a second well, which, on the basis of initial tests, is looking better than the first. It is Deep Rock Oil Corp. 2 Johnpeter, SW SW SE 23-1n-3w, a diagonal southwest location from No. 1 Initial flow with well open only 2 hours was 37 bbl. per hour. Casing is perforated at 2,541-47 ft. in the discovery well's Devonian pay zone. Top of the pay was logged at 2,499 ft. The discovery well produces from an interval at 2,554-60 ft. This pool, located about 7 miles south of Carlyle, is 6 miles from any other production and more than 20 miles from nearest lime production.

J. B. Buchman and C. E. O'Neal have a prospective producer in their 1 Boswell, SE SE SE 24-P-26, 1½ miles southwest of Hebbardsville, and ¾ mile southwest of production at the south end of the Hebbardsville pool, in southeastern Henderson County, near the McLean County line, in western Kentucky. Prospective pay zone is the O'Hara lime, with saturation logged at 2,214-23 ft. Approximately 220 ft. of clean oil with 160 ft. of mud-cut oil was discovered following a 60-minute drill-stem test. During the test, gas showed at the surface within 45 minutes. Indicated bottom-hole pressure was 1,285 ft. Hole has been drilled to 2,305 ft. and casing run through the pay zone to 2,273 ft.

A new pool has been opened about 3 miles north of Whitesville, Ohio, County, Kentucky, where Walter Steigmeir and associates have completed their 1 Phillips pumping 151½ bbl. of clean oil per day from Barlow sand at 770-793½ ft. Pay zone was shot with 80 qt.

About 9 miles north of Evansville in northern Vanderburgh County, Indiana, A. J. Slagter got a good show of gas and recovered 56 ft. of clean oil and 60 ft. of oil-cut mud in a drill-stem test in McClosky lime at his 1 Johnson, SE NW NE 34-4s-10w. Interval tested was at 2,158-65 ft. A second test, taking in more section at 2,156-90 ft. yielded oil and gas-cut water. Operators have run casing on top the zone for production tests.

ILLINOIS SUCCESSFUL WILDCATS

Edwards County: Barron Kidd 1 Cowling, NW SE SE 4-1s-14w, IP 71 bbl., O'Hara 2,987-92 ft., TD 3,113 ft. (opens new pool).

(Continued on page 162)

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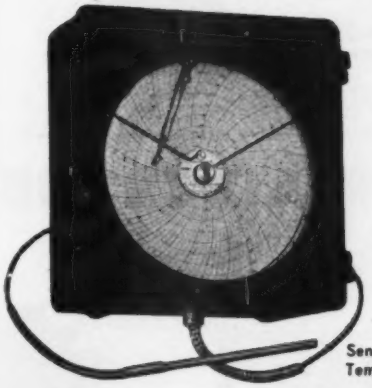

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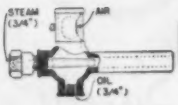

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Louisiana-Arkansas

Two Caddo Wildcats Scheduled for Tests

SHREVEPORT.—Two Caddo wildcats, at opposite ends of the parish, are scheduled for testing. Plymouth Oil Co. 1 Annie L. Webb, prospective discovery in the southeast corner of Caddo Parish, 4-16n-13w, ran 5½-in. casing to total depth at 4,840 ft., perforated the interval 4,806-19 ft., and acidized with 2,500 gal. acid. Gulf Refining Co. 279-N Caddo Lee Board, 11-20n-16w, in the northwest portion of Caddo Parish, has run 5½-in. casing to 6,754 ft. with the bottom of the hole at 7,993 ft., total depth.

Plymouth's well encountered 5½ ft. of pay sand in Rodessa cores cut at 4,787-4,817 ft. (4 ft.) and 4,817-35 ft. (1½ ft.). If current tests indicate commercial production this well will be the secondary discovery for Plymouth in Caddo Parish—the first opened Greenwood pool (12-17n-16w) last year. Gulf's plans call for testing a section of 6,600-6,700 ft.

In Tubal field, Columbia County, Arkansas, McAlester Fuel Co. and Murphy Corp. 1 Jolley, 29-19s-18w, found a slight show of oil in the Cotton Valley at 8,012-20 ft. A core from this interval recovered nearly 5 ft. of tight sand with slight oil stain and odor. A drill-stem test at 8,014-20 ft. yielded 50 ft. of oil and 10 ft. of mud. Well is now drilling below 8,125 ft. Murphy 1 McCarthy, 33-19s-18w, Union County, is drilling near 7,000 ft. Both holes are scheduled for 9,500-ft. Smackover tests. The discovery well at Tubal, Murphy 1 W. K. Gregory, completed about 1 year ago, was produced dually from the Cotton Valley and Smackover for several months but be-

(Continued on page 169)

Rocky Mountain

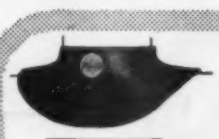
Southwestern Utah Gets Deep Drilling Program

DENVER.—With interest in future oil possibilities in Utah at a high, California Co. this week announced location for a deep test in a new province of the state. The well, 1 Pickett, SW SW NE 19-43s-15w, located in the St. George area of Washington County, is planned to go to around 7,000 ft. At this depth the operator expects to test Devonian, with the well starting in Moenkopi. There have been various shallow tests on known surface anticlines through the Virgin anticline area, but no previous deep tests in this general area of the state. California has been one of the leading operators in oil exploration through Utah and 2 years ago carried on an interesting deep drilling campaign through the Kaiparowitz region in the south-central part of the state. After completion of a disappointing discovery in the Upper Valley area, Garfield County, there has been little activity in the south-central portion of the state until recent months. California and others now indicate that exploration will be continued in the area. The lease play through the southwestern part of the state developed 2 years ago, and Stanolind Oil & Gas Co. and others have holdings in addition to a block of approximately 14,000 acres held by California in the St. George area.

Phillips Petroleum Co.'s deep wildcat in Oneida County, Idaho, is now at 12,844 ft., possibly in basal Pennsylvanian beds. The well is 1 Juniper, NW SW SW 10-14s-30e, on Juniper anticline. The company has released no information tops. The operator has had some lost circulation difficulties at the present depth, and last week after regaining circulation made a drill-stem test of the lower section. On test at 12,810-44 ft. the well made 1,620 ft. of muddy water and 350 ft. of mud. The well has established a depth record for the state, and probably a world record for thickness of Permian and Pennsylvanian section. No shows have been reported by the operator.

An interesting extension to British-American Oil Producing Co.'s Yenter pool, Logan County, Colorado, sprayed oil from the "D" sand on drill-stem test this week. The well, 2 Yenter, is an extension one location southeast of the discovery well. "D" sand was topped at 5,099 ft., 9 ft. highery structurally than the offset British-American found water in this sand, but flowing oil wells in the "J" sand, in two previous wells in this field.

Sinclair Oil & Gas Co. entered active operations in western Nebraska for the first time, with location for two wells in the Dalton area, Cheyenne County. The company has extensive holdings throughout the Denver-Julesburg basin play but has done no previous drilling. Recently Recco Oil Co.-C. E. Stout made a discovery at



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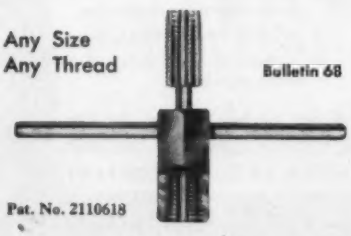

Bulletin 68

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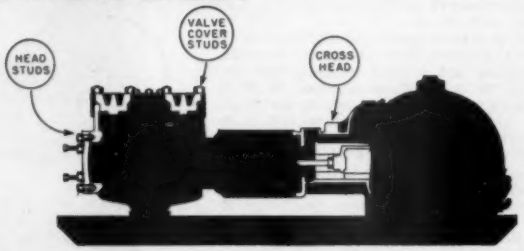

BAIRD MFG. COMPANY, P. O. Box 380—Tulsa

1 Foy, NE NE NE 30-17n-49w, and Sinclair announced an offset to the east at 1 Munshaw, NW NW NW 29-17n-49w, and south at 1 Peterson, SW NE NW 32-17n-49w. The Recco-Stout well, which has been shut down for some time, pumped 92 bbl. of oil daily on a recent test. In Colorado, Orin Tucker et al., made location for a wildcat in the Little Beaver Creek area, at 1 Hough, NW NE NE 1-2s-57w, Adams County, and for a deepening in the Orchard area, Morgan County, at 2 Orchard-State, SW NE SE 16-4n-60w. Both wells will test the Dakota series sands.

WYOMING SUCCESSFUL WILDCAT

Nowood, Washakie County: Victor Ziegler 1 Voss, 600 ft. N/S 660 ft. E/W Tract 89 5-48n-90w, TD 1,612 ft., pumped 50 bbl. of fluid per day, 50 per cent oil, Gypsum Springs 174 ft., Embar 1,256 ft., Tensleep 1,521 (?) ft.

WYOMING WILDCAT FAILURES

Pine Bluffs, Laramie County: Ryan Oil Co. 1 Scheel and UPRR, C NE SW 21-16n-61w, TD 8,322 ft., dry, Niobrara 6,690 ft., Timpas 6,984 ft., Codell 7,000 ft., Carlile 7,030 ft.,Greenhorn 7,176 ft., Graneros 7,210 ft., Muddy section 7,548 ft., "J" sand 7,660 ft., Skull Creek 7,776 ft., Cloverly 7,874 ft., Fuson 7,934 ft.,

(Continued on page 162)

Canadian Fields

Deeper Devonian Reef Pay Indicated for Leduc Area

CALGARY.—Octave Oils, Ltd., of Edmonton et al have struck light crude oil and natural gas at an exploratory venture about 3½ miles east of the main Leduc oil field. The discovery was made in a Devonian section that appears to be coral reef about 460 ft. deeper than the D3 zone. The well is Octave 1 in LSD 8, 5-50-25w4. A series of drill-stem tests in a 35-ft. interval at 5,758-93 ft. provided enough encouragement to warrant setting string of production casing for further potential and production tests.

First test in the productive formation (interval not reported) gave a maximum natural gas flow rate of 6,000,000 cu. ft. daily, with a spray of light crude oil. Gravity of the crude was around 43°. When pipe was pulled it contained about 700 ft. of oil. Some reports received stated that same water was also present in the pipe, but they are unconfirmed. Latest test gave the same rate of natural gas, plus an oil flow reaching the surface 52 minutes after valve was opened.

The Octave wildcat is 3½ miles east of the southeast corner of Leduc-D2-D3 oil field, and 3 miles northeast of McLeod-D2 oil pool.

Albercan Oil Corp. is running string of casing at its Castlewood wildcat in East Central Saskatchewan. The well completed drilling at 4,142 ft. and ran a series of electrologs, results of which warranted running casing. The 5½-in. string of casing will be set around 2,550 ft. for tests.

Albercan-Castlewood 1, in LSD 4, 12-36-16w3, is about 48 miles south of North Battleford and about 5 miles southwest of Castlewood railpoint.

Shell Oil Co. has found slight to moderate flows of natural gas at its Horse Hills exploratory venture in the Muskwa area of North Central Alberta. Drilling crew had difficulty maintaining circulation in the gas zone, so a string of casing was run. Drilling is to continue.

The well is Shell-Horse Hills 1, in LSD 13, 24-84-2w5, about 185 miles north of Edmonton and 10½ miles southeast of Shell's Muskwa stratigraphic test 3, which suspended drilling operations last spring. Hole is currently bottomed at 1,585 ft., and string of 8⅝-in. casing is set at 1,184 ft. Best drill-stem test run in the gas zone was at 1,543-48 ft., with gas flow rate 213,000 cu. ft. daily. Other tests higher up and below also gave slight gas flows.

Naco, Ltd., has swabbed its second Drumheller oil success into production, is preparing to run initial potential test, and will skid drilling rig ¼ mile for the next drilling venture.

The new oil well is Naco-Drumheller 3, in LSD 11, 36-29-20w4, ¼ mile south of the basal Cretaceous oil discovery well. Well 3 was completed at 4,494 ft. and was swabbed into production. Company officials state that the well appears to be good for around 20 bbl. hourly. A potential test will be run within the next few days. Next driller will be Naco-Drumheller 4, in LSD 12, 36-29-20w4.

Manitoba.—A rush for mineral rights has followed the reported strike of free oil at California Standard's Daly 15-18, 8½ miles west of Virden in southwestern Manitoba and 13 miles east of the Saskatchewan boundary. The well, drilled to 5,368 ft., was plugged back to bail about 3 bbl. of oil (averaging 30 per cent water) per hour. Although the well is not considered commercial, it is regarded as encouraging for further exploration in the area.

EASTERN CANADA

Gaspe.—In the Gaspe Peninsula, Quebec Province, Quebec Oil Development 1, located 30 miles from Gaspe village, is preparing to resume operations at 2,000 ft. with the first oil zone expected around 2,200 ft. The well has been isolated for some weeks by floods which covered part of the road to a depth of 5 ft. and caused some damage.

Gaspe Oil Ventures of Montreal is below 1,000 ft. at Tar Point 1, first of a drilling program of 18 wells. The first water shut-off was made at 772 ft. On the Galt Brook Dome, well sites have been cleared and roads built for Continental Gaspe Co.'s 2, 3, and 4. Five other sites have been surveyed and located.

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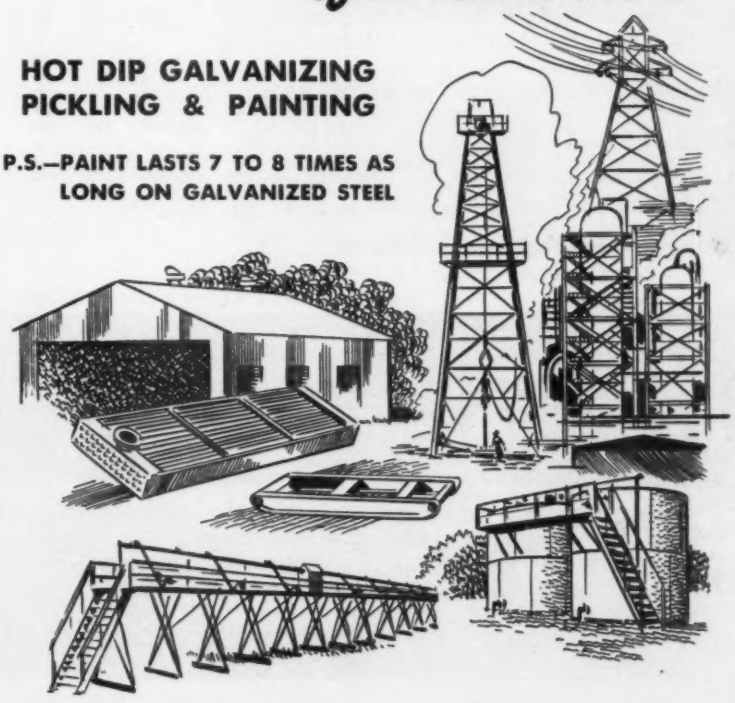

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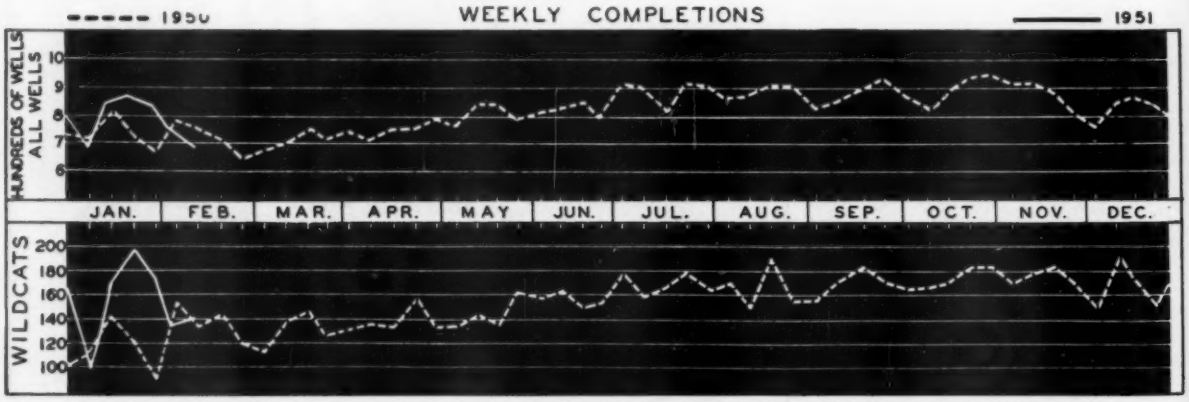
CURRENT STATISTICS

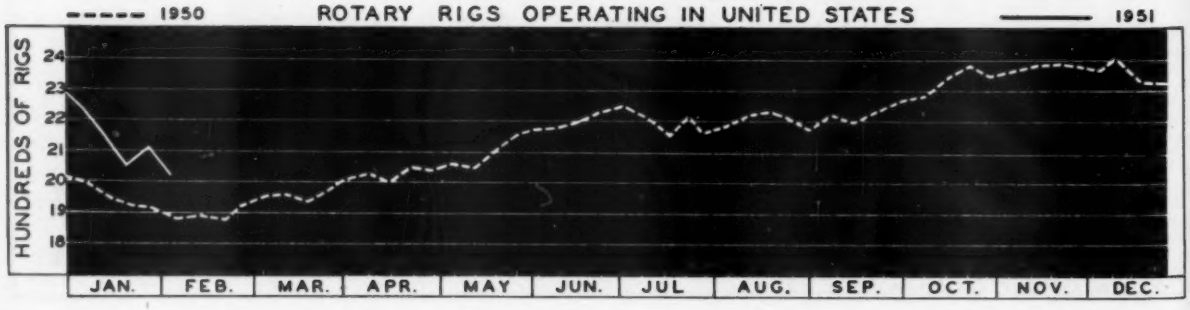
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED FEBRUARY 10, 1951

	Total of all wells					Feb. 10		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	5	3	0	*2	7,231	45	85	0	0	0	0	0	0	0	0	0	0
Pennsylvania	13	6	2	†5	32,291	94	132	0	0	0	0	0	0	0	0	1	1
West Virginia	13	0	11	2	43,952	78	66	0	0	1	0	1	0	0	3	2	5
Ohio	7	3	1	*3	15,111	99	103	0	0	0	0	0	1	0	0	5	6
Indiana	13	9	0	4	22,413	120	109	2	0	0	1	3	3	0	0	12	15
Kentucky	13	3	5	5	31,775	106	99	0	0	0	2	2	1	0	0	17	18
Illinois	26	14	0	12	76,103	251	270	2	0	0	4	6	7	0	0	37	44
Michigan	10	3	0	7	18,388	73	92	0	0	0	3	3	0	0	1	26	27
Kansas	79	47	6	‡26	265,725	473	§381	4	0	0	11	15	24	0	1	78	103
Nebraska	5	2	2	1	19,406	34	9	0	0	0	1	1	0	0	1	12	13
Oklahoma	112	58	12	42	449,627	683	537	2	0	2	19	23	30	0	5	94	129
Texas	271	174	16	81	1,234,642	1,870	1,767	9	1	2	47	59	68	8	12	306	394
North Central (Dist. 7-B & 9)	83	45	0	38	241,579	545	515	4	0	0	17	21	30	0	0	123	153
West (Dist. 7-C & 8)	100	76	0	24	548,619	563	492	4	0	0	16	20	15	0	0	66	81
Panhandle (Dist. 10)	12	5	7	0	35,748	82	155	0	0	0	0	0	0	0	0	4	4
Eastern (Dist. 5, 6, & 6-P)	11	6	1	4	37,308	133	131	0	0	0	2	2	0	0	0	20	20
Gulf Coast (Dist. 2 & 3)	38	19	8	11	242,719	281	245	0	1	2	9	12	15	6	10	42	73
Southwest (Dist. 1 & 4)	27	23	0	4	128,669	266	229	1	0	0	3	4	8	2	2	51	63
Louisiana	48	27	4	17	306,602	263	315	2	0	0	6	8	5	0	0	36	41
Northern	25	13	4	8	100,309	131	167	1	0	0	4	5	2	0	0	21	23
Southern	23	14	0	9	206,293	132	148	1	0	0	2	3	3	0	0	15	18
Arkansas	6	5	0	1	21,262	55	44	0	0	0	0	0	1	0	0	9	10
Mississippi	3	2	0	1	22,000	24	37	1	0	0	1	2	3	1	0	7	11
Southeastern States	0	0	0	0	0	9	7	0	0	0	0	0	0	0	0	2	2
Montana	3	2	0	1	9,542	17	18	0	0	0	1	1	0	0	0	2	2
Wyoming	10	6	1	3	46,103	73	78	1	0	0	2	3	2	0	0	14	16
Colorado-Utah	3	0	0	3	20,750	31	17	0	0	0	3	3	0	0	0	17	17
New Mexico	11	7	2	2	61,975	74	86	0	0	0	0	0	1	0	3	9	13
California	33	22	2	9	146,025	197	202	2	0	1	7	10	5	0	1	42	48
Miscellaneous	0	0	0	0	0	3	1	0	0	0	0	0	0	0	2	1	3
Total United States	684	393	64	227	2,850,923	4,672	4,455	25	1	6	108	140	151	9	29	729	918
Total previous week	753	420	55	278	2,871,291	....	....	26	1	1	110	138	126	8	23	621	778
Total February 10, 1950	753	435	43	275	2,869,217	....	....	13	2	2	117	134	108	12	27	609	756

Service wells included: *2, †5, ‡1. §Revised.





DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 10 crude oil	B. of M. Feb. demand	Feb. 3 crude oil
Alabama	2,550	2,400	2,800
Arkansas	78,700	88,000	78,750
California	957,900	968,000	965,900
Colorado	76,300	72,000	77,300
Eastern	58,500	67,000	60,450
Florida	1,675	1,600	1,550
Illinois	157,200	172,000	166,500
Indiana	27,800	31,000	28,400
Kansas	235,150	304,000	304,100
Kentucky	28,100	31,000	28,000
Louisiana	605,200	620,000	599,400
North Louisiana	116,200	.....	115,950
South Louisiana	489,000	.....	483,450
Michigan	42,700	46,000	42,900
Mississippi	99,350	116,000	103,700
Montana	22,300	23,000	22,500
Nebraska	10,100	7,000	8,800
New Mexico	136,325	138,000	135,150
Oklahoma	505,300	483,000	504,750
Texas	2,560,450	2,425,000	2,554,700
Dist. 1 (Southwest)	31,800	.....	32,200
Dist. 2 (Southwest)	152,050	.....	152,775
Dist. 4 (Southwest)	239,800	.....	238,525
Dist. 3 (Gulf Coast)	457,000	.....	454,300
Dist. 5 (Eastern)	46,650	.....	46,350
Dist. 6 (Eastern)	103,800	.....	102,625
East Texas field	272,000	.....	272,000
Dist. 7-C (West)	78,575	.....	78,100
Dist. 8 (West)	864,925	.....	856,750
Dist. 7-B (W. Central)	77,400	.....	77,650
Dist. 9 (N. Central)	146,450	.....	153,425
Dist. 10 (Panhandle)	90,000	.....	90,000
Utah	3,300	5,000	3,200
Wyoming	189,900	180,000	182,100
Total United States	*5,798,800	5,780,000	5,870,950
Change from prev. week, down	72,150		
Canada	.....	.....	77,235

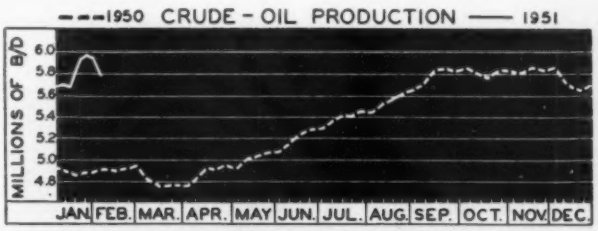
Total U. S. production January 1-February 10 .. †249,338,320 bbl.
Same period last year (crude plus cond.) ..... 203,546,920 bbl.

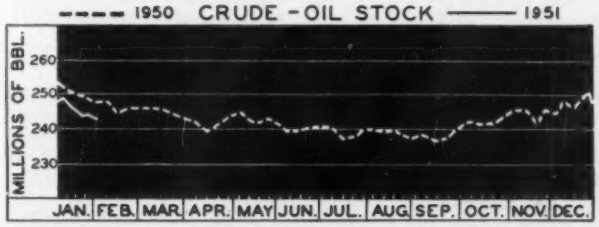
*Not including 105,105 bbl. condensate. †Including 4,238,815 bbl. condensate.

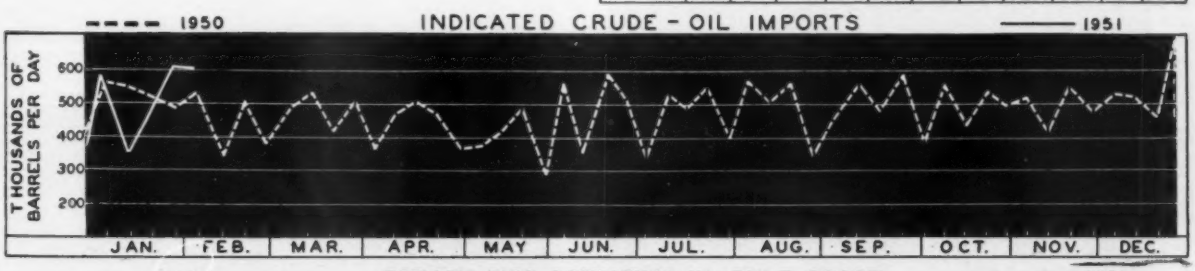
CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

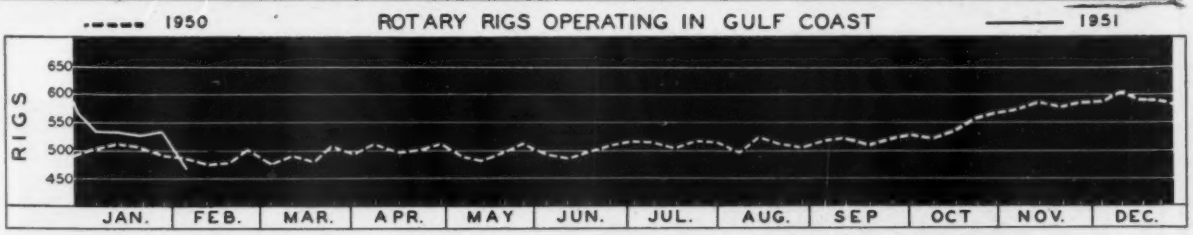
	Feb. 3, 1951	Jan. 27, 1951	Feb. 4, 1950
Pennsylvania Grade	2,141	2,102	2,726
Other Appalachian	1,096	1,261	1,824
Illinois, Indiana, Michigan	10,026	10,230	11,376
Arkansas	2,419	2,464	3,000
Louisiana	14,687	14,702	14,610
North	2,967	2,889	3,630
Gulf	11,720	11,813	10,980
Mississippi	3,536	3,656	2,529
New Mexico	6,924	6,937	7,171
Oklahoma and Kansas	37,401	38,446	35,722
Texas	114,172	114,387	110,985
East Texas	14,174	14,184	15,029
West Texas	43,903	45,387	38,881
Texas Gulf	27,332	26,884	30,316
Other Texas	28,763	27,932	26,759
Rocky Mountain	12,148	12,302	13,183
California	31,640	31,289	37,334
Foreign	6,608	6,454	7,657
Total	242,798	244,230	248,117

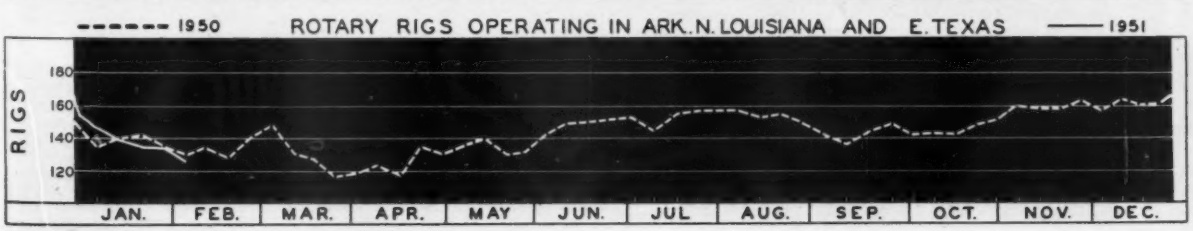
*Bureau of Mines.









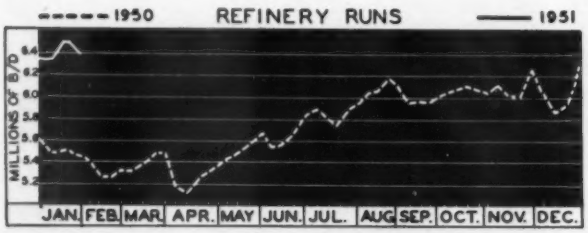

1950 ROTARY RIGS OPERATING IN ARK. N. LOUISIANA AND E. TEXAS 1951
RIGS
180
160
140
120
JAN. FEB. MAR. APR. MAY JUN. JUL AUG. SEP. OCT. NOV. DEC.

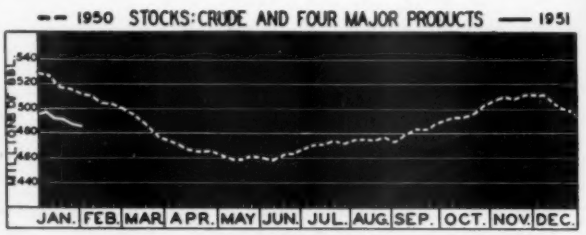
A.P.I. REFINERY REPORT, FEBRUARY 3

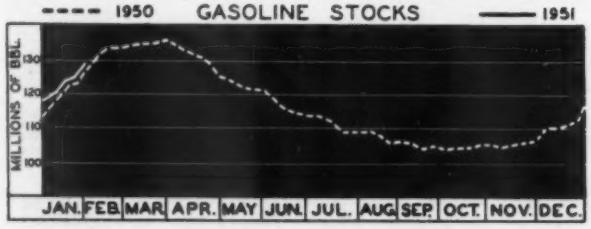
(Thousands of barrels)

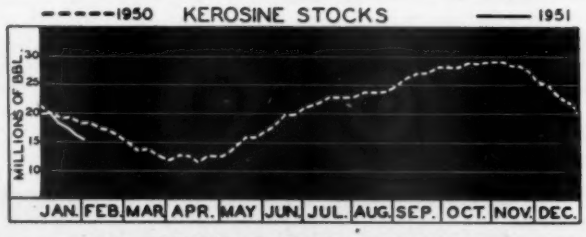
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, February 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,012	379.3	51.3	287.4	252.3	23,972	6,126	17,471	9,516	784	343.4	36.5	168.6	209.9
Appalachian:														
District 1	92	37.8	4.7	15.7	11.0	3,039	272	537	272	89	39.4	6.3	14.1	12.6
District 2	76	33.6	6.4	8.9	13.4	1,165	123	95	161	63	29.1	4.9	7.2	17.2
Ind., Ill., Ky.	1,200	602.3	81.4	241.9	197.8	28,586	3,400	7,542	3,190	980	496.1	72.2	170.6	169.6
Okla., Kans., Mo.	555	287.7	23.7	121.7	82.3	14,064	698	7,063	1,150	450	254.4	16.6	99.3	65.9
Inland Texas	228	154.3	11.7	32.7	41.9	4,256	392	847	602	206	137.3	12.9	27.8	41.1
Texas Gulf Coast	1,518	626.0	130.3	380.0	264.0	22,322	2,178	8,686	5,083	1,218	579.2	103.5	243.4	226.1
La. Gulf Coast	501	219.4	69.3	121.3	74.9	8,792	1,283	2,779	2,119	440	205.5	58.1	92.2	50.0
N. La. and Ark.	72	29.3	7.3	16.4	7.4	2,937	233	878	72	73	27.1	9.2	12.2	15.1
Rocky Mountain:														
New Mexico	14	7.4	.4	2.9	2.9	107	25	65	32	14	7.8	.3	2.5	3.3
Other Rocky Mtn.	207	90.0	7.3	40.0	48.4	4,303	241	1,421	794	175	82.4	5.3	35.7	40.3
California	920	387.3	12.3	129.0	369.6	16,157	663	9,392	17,626	824	350.4	12.4	152.4	320.8
February 3, 1951	6,395	2,854.4	406.1	1,397.9	1,365.9	129,700	15,634	56,776	40,617	5,316	2,552.1	338.2	1,026.0	1,171.9
January 27, 1951	6,483	3,015.1	410.4	1,422.0	1,415.0	126,261	16,446	58,997	40,378	.....	.....	.....	.....	.....
February 4, 1950	5,420	2,547.1	359.0	1,047.9	1,160.1	127,437	18,095	64,039	54,590	.....	.....	.....	.....	.....

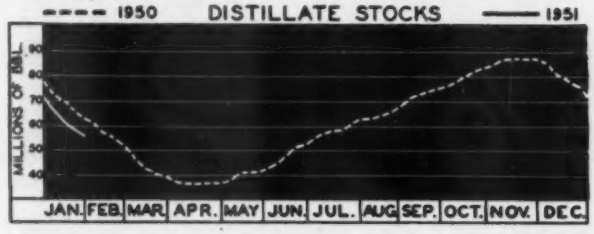
*At refineries including natural blended. †Finished and unfinished.

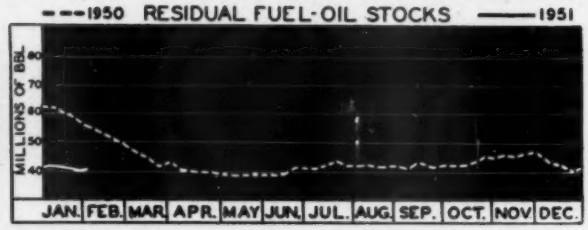


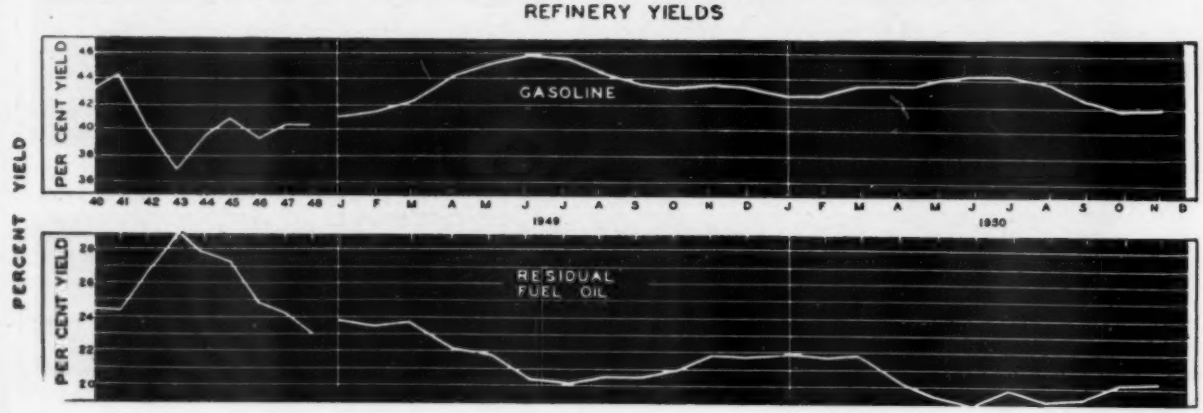












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

RECENT increases in coal prices for the eastern states have resulted in a higher coal-residual fuel parity, giving heavy fuel a distinct price advantage at a time when stocks are so low that demand must be met from current refinery production and imports.

Residual stocks are just above 40,000,000 bbl., very near the minimum working level. Residual imports reached an all-time high in December, and current reports indicate very little change from that level since the first of the year. Total residual imports in January may be as much as 2,500,000 bbl. greater than for January last year, but in January 1950 shipments of residual fuel from California to East Coast ports amounted to 2,600,000 bbl. The gain in imports is not increasing East Coast supply. It is merely replacing California fuel that is no longer available. Gulf-East Coast inventories of residual are about 2,000,000 bbl. less than last year. Unless imports are increased still further, gains in deliveries on the East Coast are limited by increases in residual production at Gulf-East Coast refineries.

Suppliers on the East Coast are expected to petition for an increase in heavy-fuel prices but probably not until oil-price regulations are clarified. Meanwhile, the lack of balance between Gulf Coast and East Coast prices becomes more important since expiring tanker charters must be renewed at much higher rates.

Many of the tank cars which were tied up in major rail centers during the strike are now moving. Both clean and dirty cars are more readily available for product shipment from Mid-Continent refineries. However, pressure cars for L.P.G. movement are still very tight and are expected to be short for the remainder of the winter. Since these cars are also needed for movement of avgas components, the shortage may continue.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of February 12, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅛-11½	13.5-13.75	11½-12
42-44 w.w. kerosine	9¼-9⅜	10-10.1	8¾-9
No. 2 straw fuel oil	8⅜-8⅝	9-9.25	7¾-8
No. 6 residual	$1.80-1.90	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La
Grade 26-70	6⅞	6⅜	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

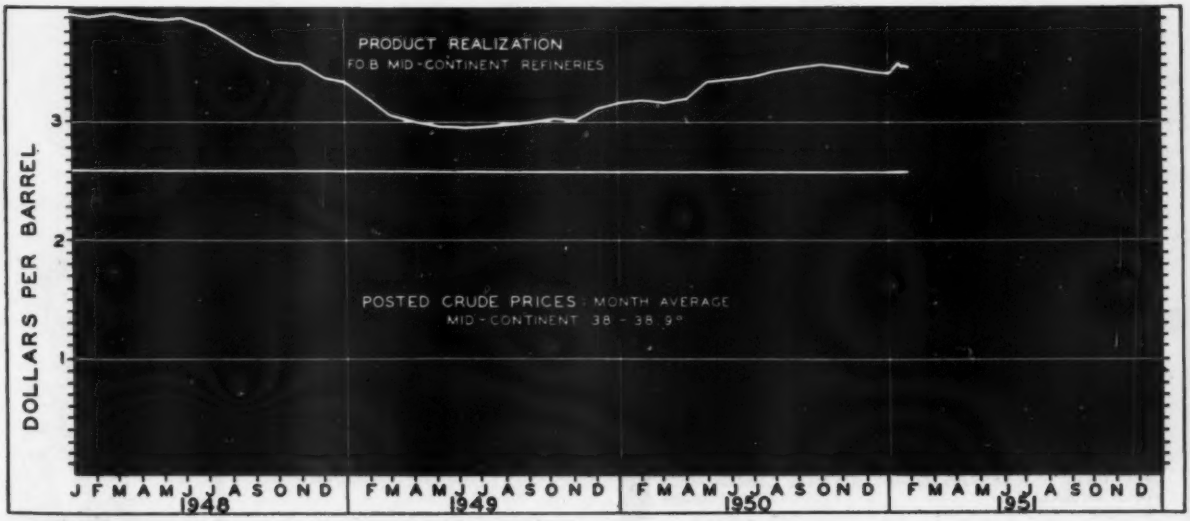
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.49 for week ended February 3, $3.51 for previous week, and $3.23 for February 1950.

Oklahoma Fields

(Continued from page 153)

Lincoln County: Mid-Continent 1 Johnson, SW SW NW 25-13n-6e, dry, TD 4,211 ft., Hogshooter 1,635 ft., Layton 1,730 ft., Checkerboard 2,020 ft., conglomerate 2,030 ft., Oswego 2,958 ft., Prue 2,968 ft., Verdigris 3,068 ft., Skinner 3,122 ft., Inola 3,454 ft., Bartlesville 3,480 ft., unconformity 3,756 ft., Caney 3,768 ft., Mayes 3,976 ft., Woodford 4,150 ft., unconformity 4,176 ft., Chimney Hill 4,182 ft.

Preston Oil Co. et al 1 Whitney, SW SW SE 20-14n-2e, dry, TD 4,878 ft., Hogshooter 3,660 ft.. Checkerboard 3,978 ft., conglomerate 4,012 ft., Verdigris 4,695 ft., Skinner 4,800 ft., lime 4,850 ft., Red Fork 4,852 ft.

Murray County: Brown 1 Crawford, SE SE SW 36-2n-3e, dry, TD 535 ft., sand 100 ft., 207 ft., and 419 ft., bailed 15 gal. oil in 24 hours.

Osage County: Peters 1 Osage, SW SW SE dry, TD 2,974 ft., Oswego 2,591 ft., Skinner 2,775 ft., lime 2,790 ft., sand 2,810 ft., Mississippi lime 2,963 ft.

Payne County: Clark & Cowden Drilling 1 Hunt, SW NW SW 27-19n-1w, dry, TD 4,900 ft., Avant 3,545 ft., no Perry sand, Layton 3,860 ft., Oswego 4,510 ft., lime 4,839 ft., Red Fork 4,875 ft.

Texas Co. 1 Pickering, SW SW NW 29-19n-4e, dry, TD 3,804 ft., Hogshooter 2,759 ft., Layton 2,783 ft., Lenopah 3,078 ft. upper conglomerate 3,218 ft., lower conglomerate 3,362 ft., Oswego 3,390 ft., Prue 3,485 ft., Verdigris 3,564 ft., Skinner 3,577 ft., Senora 3,665 ft., lime 3,703 ft., Red Fork 3,778 ft. and 3,790 ft.

Mid-Continent 1 Pickering, SW SW NE 29-19n-4e, dry, TD 3,966 ft., Layton 2,771 ft., Checkerboard 3,065 ft., conglomerate 3,076 ft., Prue 3,355 ft., Big lime 3,383 ft., Oswego 3,450 ft., Prue 3,495 ft., Verdigris 3,557 ft., Skinner 3,568 ft., lower Skinner 3,672 ft., lime 3,696 ft., Red Fork 3,781 ft., lime 3,886 ft., Burgess 3,954 ft., Mississippi lime 3,962 ft.

Foster Drilling Co. 1 Williams, NW NW SE 20-19n-4e, dry, TD 4,095 ft., Checkerboard 3,063 ft., Peru 3,340 ft., Big lime-Oswego 3,370 ft., Prue 3,485 ft., Verdigris 3,550 ft., upper Skinner 3,557 ft., lime 3,680 ft., Red Fork 3,713 ft., no Bartlesville, lime 3,870 ft., Mississippi lime 3,947 ft., Misener 4,089 ft., Sylvan 4,090 ft.

Pontotoc County: Kingery Drilling Co., 1 Clark, SE NE NE 35-4n-5e, dry, TD 1,350 ft., sand 1,344 ft.

Pottawatomie County: Wood Oil Co. and Ohio Oil Co. 1 Patterson, NE SW NE 9-6n-4e, dry, TD 4,889 ft., Belle City 2,073 ft., upper Layton 2,440 ft., lower Layton 2,540 ft., Senora lime 3,577 ft., Senora sand 3,580 ft., Earlsboro 3,785 ft., Mississippi Caney 3,890 ft., Mayes 4,078 ft., Woodford 4,160 ft., no Hunton, Sylvan 4,436 ft., Viola 4,520 ft., dense 4,575 ft., porous dolomite 4,667 ft., no first Wilcox, second Wilcox 3,860 ft.

Stephens County: Globe Oil & Refining 1 State "N," NW SW SE 13-1n-9w, dry, TD 4,960 ft., base Permian-top Pennsylvanian 1,640 ft., Big lime 3,011 ft., conglomerate 3,551 ft., sand 4,656 ft., dolomite conglomerate 4,896 ft., granite wash 4,917 ft.

Tillman County: Lewis-Mucher-Cassell 1 Kelly, SW SW SE 28-3s-16w, dry, TD 3,725 ft., upper Gunsight sand 2,822 ft., lower Gunsight sand 3,036 ft., Twin lime 3,118 ft., Canyon lime 3,214 ft.

Illinois Fields

(Continued from page 155)

Wabash County: National Drilling Co. 1 Johnson, NE NE SE 24-2s-14w, IP 8 bbl., Cypress 2,514-20 ft., and Benoist 2,602-12 ft., TD 2,612 ft. (extension New Harmony Consolidated pool).

ILLINOIS WILDCAT FAILURES

Gallatin County: Oil Management, Inc., 1 Foster Community, SE SE SW 36-8s-8e, dry, TD 2,780 ft.

Richland County: Sanders-Frye Drilling Co. 1 Moseley, SE SW NW 15-3n-9e, dry, TD 3,024 ft.

Washington County: Rock Hill Oil Co. and Miami Operators Co. 1 Palek, NE NW SW 32-2s-4w, dry, TD 2,404 ft.

Wayne County: Nation Oil Co. 1 Rigg, SW NE SE 33-1s-9e, dry, TD 3,000 ft.

INDIANA SUCCESSFUL WILDCATS

Posey County: W. A. Schuller 1 Mattingly, SE NW NW 31-6s-13w, IP 120 bbl., Aux Vases sand 2,702-20 ft., TD 2,725 ft. (new pay zone).

Vanderburgh County: Barron Kidd 1 Harris, SW SE SW 18-5s-11w, IP 70 bbl., lower O'Hara 2,652-62 ft., TD 2792 ft. (new pool).

INDIANA WILDCAT FAILURE

Marshall County: A. S. Giesen 1 Lowry, SW SW SW 32-35n-1e, dry, TD 706 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: National Associated Petroleum Co. 1 Miller, SE SW SE SW 15-O-25, dry, TD 2,562 ft.

G. L. Reasor 1 Priest, NW NE SE NW 16-P-26, dry, TD 2,416 ft.

EASTERN KENTUCKY

ASHLAND.—In Ida May pool of southern Lee County, Douglas Parrish, Jr. et al have completed 1 Newman heirs for an initial potential of 26 bbl. of oil daily from Corniferous lime at 1,014-91 ft., total depth.

In Big Sandy gas field, Pike County sector, Kentucky West Virginia Gas Co. completed 5960 Jesse Roberts for 1,050,000 cu. ft. of gas daily from Maxon sand at a total depth of 1,819 ft. The well was not shot. The same company also completed 5968 Wilburn Newsom on Shelby Creek, Pike County, for 539,000 cu. ft. of gas daily from Devonian black shale at total depth of 3,655 ft.

Rocky Mountains

(Continued from page 157)

Lakota 7,956 ft., Morrison 8,044 ft., Sundance 8,156 ft., Red Beds 8,302 ft.

Nowood, Washakie County: Western Oil Associates 1 Rooth-Government, SE NE NW 8-48n-90w, TD 1,710 ft., dry, Sundance 137 ft., Dinwoody 1,290 ft., Embar 1,373 ft., Tensleep 1,610 ft.

COLORADO WILDCAT FAILURES

Table Mountain, Boulder County: Brinkerhoff-Davis-Hill 1 Brooks-Tolts, SE SE NW 18-3n-69w, TD 5,662 ft., dry, Hygiene 2,192 ft., Muddy 5,460 ft., Dakota 5,648 ft.

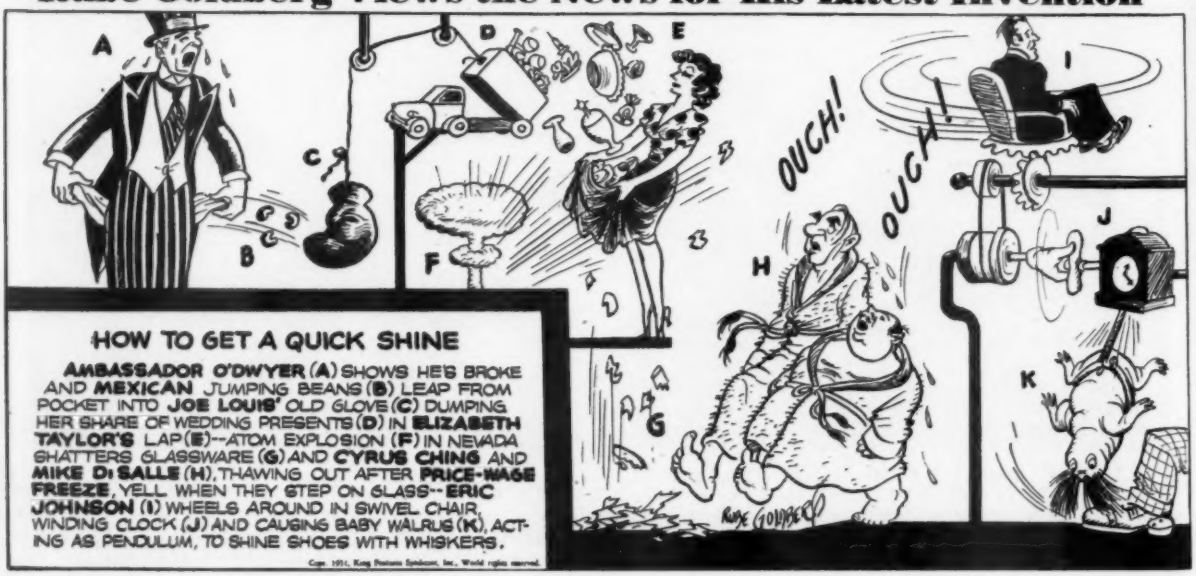
Craig Dome, Moffat County: General Petroleum Corp. 88-9-P, SE SE SE 9-6n-91w, TD 10,003 ft., dry, Mancos 2,530 ft., Frontier 7,454 ft., Dakota 7,872 ft., Morrison 7,938 ft., Curtis 8,402 ft., Nugget 8,500 ft., Chinle 8,656 ft., Shinarump 9,132 ft., Weber 9,727 ft.

Frazier, Washington County: Ward & Frazier 1 Frazier, SW NE 4-5s-56w, TD 5,085 ft., dry, Niobrara 4,024 ft., Greenhorn 4,670 ft., Muddy 4,965 ft., Dakota 5,085 ft.

MONTANA WILDCAT FAILURE

Bootlegger, Chouteau County: General Petroleum Corp. 8-11-P-Kaun, SW SW SW 11-27n-3e, TD 4,235 ft., dry, Kootenai 1,460 ft., Morrison 1,805 ft., Swift 1,885 ft., Madison 2,015 ft., Devonian 3,053 ft., pre-Cambrian 4,191 ft.

Rube Goldberg Views the News for His Latest Invention



HOW TO GET A QUICK SHINE

AMBASSADOR O'DWYER (A) SHOWS HE'S BROKE AND **MEXICAN** JUMPING BEANS **(B)** LEAP FROM POCKET INTO **JOE LOUIS'** OLD GLOVE **(C)** DUMPING HER SHARE OF WEDDING PRESENTS **(D)** IN **ELIZABETH TAYLOR'S** LAP **(E)**—ATOM EXPLOSION **(F)** IN NEVADA SHATTERS GLASSWARE **(G)** AND **CYRUS CHING** AND **MIKE DI SALLE (H)**, THAWING OUT AFTER **PRICE-WAGE FREEZE**, YELL WHEN THEY STEP ON GLASS—**ERIC JOHNSON (I)** WHEELS AROUND IN SWIVEL CHAIR, WINDING CLOCK **(J)** AND CAUSING BABY WALRUS **(K)**, ACTING AS PENDULUM, TO SHINE SHOES WITH WHISKERS.

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EQUIPMENT MEN . . . in the News

Stabelfeldt New Edward Valve Advertising Manager

Bruce K. Stabelfeldt has been appointed advertising and sales promotion manager of Edward Valves, Inc., East Chicago, Ind.

Stabelfeldt was formerly advertising manager of Blackhawk Manufacturing Co., West Allis, Wis. He attended University of Wisconsin Extension and Layton Art Academy of Milwaukee.

Houston Industrial Show To Include Oil Equipment

Advanced designs in tools, machinery, and materials for all branches of the petroleum industry will be on display at the International Industrial Exposition to be held in Houston, from March 11 through 17, 1951.

Particular emphasis will be placed on the scientific and technical development of oil equipment and the application of new and improved products for modern drilling, production, and refining techniques, according to E. G. Lenzner, general manager of the exposition.

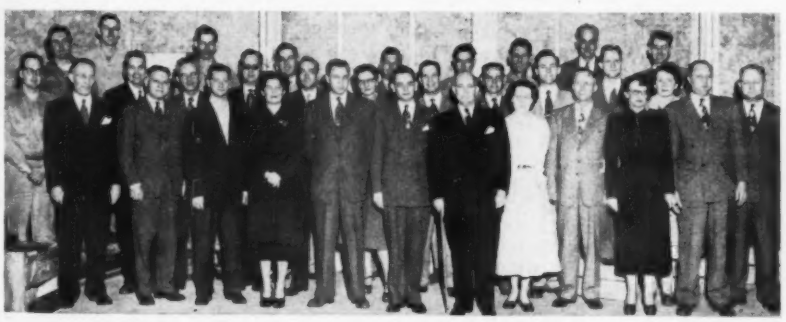
Much of the equipment will be in operation to show performance under actual field and plant conditions. Included will be demonstrations of special services that have been developed to increase efficiency in modern operations. Since one of the chief aims of the exposition is the scientific and technical advancement of industry, provision is being made for the presentation of results achieved by research and experimental work being conducted by the universities and colleges. Arrangements are also being made for special meetings and technical exhibits by technical societies, and space is being provided by the management for this purpose.

Boyd Joins Born As Chief Engineer

L. A. Boyd has been appointed chief engineer for Born Engineering Co., Tulsa, according to Dr. Sidney Born, president of the organization.

Boyd, formerly chief engineer of Texas Natural Gasoline Corp., comes to Born with an extensive background in processing, research, design, and development. After college, he served in the U. S. Army and in 1917 worked as chemist for the Transcontinental Oil Co. His experience includes such various capacities as plant chemist, superintendent, district and general superintendent for Signal Oil & Gas Co., and Gas & Oil Products. He was for the past 8 years chief engineer for Warren Petroleum Corp. in Tulsa before joining Born early this year.

Happy Mid-Continent Representatives Meet at Tulsa



Meeting in Tulsa for a 3-day session on sales and engineering phases, Mid-Continent representatives and home-office personnel of The Happy Co. are: (front row) F. W. Robson, Tulsa; W. H. Willis Gorey, Tulsa; C. D. Green, Tulsa; Ruth Bankey, Tulsa; Charles C. Stanley, assistant division manager, Odessa; W. T. Swearengen, Tulsa; Paul E. Mahaffey, president, Tulsa; Nell Hagar, Tulsa; Roy C. Lindley, secretary-treasurer, Tulsa; Jean Luell, Tulsa; and Leo C. King, vice president in charge of sales, Tulsa. Second row: T. E. Moore, Tulsa; Charles Agard, Tulsa; Lee Allen, Tulsa; R. B. Rundle, division manager, Seminole; E. L. Williams, division manager, Wichita, Kans.; John Tinker, Tulsa; Ed Allan, division manager, Tulsa; F. E. (Dusty) Rhoads, division manager, Salem, Ill.; John E. Mahaffey, Tulsa; Madge Gates, Tulsa; Harold Ashworth, assistant division manager, Seminole; Orville Smith, Tulsa; Kenneth Vosbrink, Tulsa; John Ritter, division manager, Odessa; Cecil White, Tulsa; James Lee, Tulsa; Murray Carr, Tulsa; Jack Simpson, division manager, Dallas; Oscar Bankey, Tulsa; Mabel Tidmore, Tulsa; and Ben E. Shelton, division manager, Kilgore, Tex.

Oilwell Announces Four Advancements

Fred F. Murray, president of Oil Well Supply Co., has announced the appointments of M. F. Hazel as director of engineering, and Alex Quayle as chief engineer in charge of all product design.

M. F. HAZEL

ALEX QUAYLE

Melvin Dixon, district manager of Oilwell's Illinois district, has been named manager of the West Texas district, with headquarters at Midland, Tex., according to V. J. Waters, Central Midwest division manager.

Dixon succeeds T. E. Bowers who has been appointed to the newly created position of district merchandise manager of the West Texas district.

Hazel has served as Oilwell's general manager of sales since January 1, 1948. Quayle was chief engineer in charge of product design at Imperial Works, Oil City, Pa., Oilwell's principal manufacturing plant. In his new position he will be located at the company's home office in Dallas.

Joining Oilwell in 1936, Dixon served in branch stores and as a field salesman until February 1943, when he became manager of the Grandville, Mich., store. In July 1945 he was named assistant district manager of the Illinois district and was promoted to district manager in October 1946.

Bowers is a veteran of 22 years with Oilwell. After serving in various stores in Texas, Oklahoma, and New Mexico, he was appointed manager of the Odessa, Tex., store.

Hooker Announces Two Executive Promotions

The board of directors of the Hooker Electrochemical Co., Niagara Falls, N. Y., has elected Edwin R. Bartlett to chairman of the board of directors. R. Lindley Murray was at the same time promoted to the office of president of the company.

Bartlett has been associated with Hooker since 1907 in various capacities, having been made a vice president and director in 1924. He has been

president of the firm since 1945. Murray has been with Hooker since 1916. He has been a director since 1937.

Cenco Purchases Refinery Supply

W. A. SCHLUETER

W. A. Schlueter, president of The Refinery Supply Co., of Tulsa, and E. P. Holder, chairman of Cenco Corp. and Central Scientific Co., have announced the purchase of The Refinery Supply Co. by Cenco Corp. No real estate is involved in the transaction.

Refinery Supply will continue to operate as such, and Schlueter will continue as its president. He has joined Central Scientific Co. as a director and vice president.

Refinery Supply will enlarge its field by handling the Cenco line and will maintain inventories at Tulsa to facilitate deliveries in the southwestern territory.

Central Scientific will handle Refinery items at its various warehouses, insuring better service to more distant points which are now served from Tulsa.

LAV Starts Constellation Flight to Lima, Peru

LAV, the Venezuelan airline, has announced the expansion of its service to include Lockheed Constellation flights from New York to Lima, Peru, via Havana and Caracas. Rafael Arraiz, president of the airline, said that this extension of LAV's regular routes was made possible by an agreement between the good-neighbor governments of Venezuela and Peru.

The flight is named El Liberator and is the first and only nonstop air link between the capital cities of Caracas and Lima.

Navratil Joins Bingham Pump Co. in New York

Frank Navratil has joined the sales organization of Bingham Pump Co., Portland, Ore., in line with the company expansion program.

Navratil, who has a B.S. degree in mechanical engineering from Newark College of Engineering, will have headquarters in the company's New York office.

Along with an extensive technical and engineering background, Navratil has also had broad experience in the industrial equipment field, making him well qualified to serve Bingham customers in the New York territory.

Houston Nomads Elect 1951 Officers

Officers elected by the Houston Chapter of Nomads at its annual dinner dance held at the Shamrock Hotel on January 27 are: (front row) E. F. Baldwin, Hughes Tool Co., secretary-treasurer; Wayne Rives, The Oil and Gas Journal, president; E. H. Lorehn, Cameron Iron Works, regent; and Jay Speece, Gardner-Denver, deputy sergeant-at-arms. Second row: Tracy Word, Jr., Well Equipment Manufacturing Co., regent; Herschel Wood, Lebanon Steel Foundry, vice president; Larry Kelley, Hillman Kelly Co., assistant secretary-treasurer; Bob Franklin, Rolo Manufacturing Co., sergeant-at-arms; and Harry Estes, A-1 Bit & Tool Co., executive secretary.

Wilson Leaves Independent Offers Consulting Service

J. H. WILSON

John H. Wilson, vice president and manager of Independent Exploration Co.'s North Texas office in Fort Worth, has resigned to open his own office as a consultant specializing in exploration programs. He will serve Independent Exploration Co. as a consultant.

David B. Campbell, with Independent for 15 years and former supervisor of the Fort Worth office, has been moved up to the position of district manager. He will be assisted by George H. Harrington, Jr., who has also served in Independent's Fort Worth office for several years.

Lane-Wells Buys Well Surveys, Inc., Stock

Lane-Wells Co. has purchased 50 per cent of the capital stock of Well Surveys, Inc., of Tulsa. The remaining half of Well Surveys' stock is owned by Socony-Vacuum Oil Co., Inc.

Well Surveys, Inc., was formed in 1939 to engage in the development and exploration of radioactivity well-logging techniques and equipment. Lane-Wells Co. has been the principal licensee under Well Surveys' patents and has performed over 30,000 well-logging operations since this service was introduced in 1940.

Rodney S. Durkee, president, and Dr. Russell M. Otis, manager of research and patent department of Lane-Wells, have been elected directors of Well Surveys. The other members of the board are: Willis W. Hardy, Socony-Vacuum; Henry Cortes, Magnolia Petroleum Co.; and W. G. Green, president of Well Surveys.

Officers of Well Surveys, Inc., are W. G. Green, president; Charles E. Duller, vice president and treasurer; Robert K. Schumacher, secretary; and E. B. Clemons, assistant secretary.

Continental Supply Co. Names Store Managers

Continental Supply Co. has announced several personnel changes. Oliver C. Davis has been made store manager of the Artesia, Colo., branch; Billie R. Riggs has been made store manager of the Brookhaven, Miss., branch; and G. N. Frost, former store manager at Brookhaven, has been transferred to Jena, La., in the same capacity.

Correction

In our issue of February 1, we carried a news item to the effect that John H. Wilson, vice president and manager of Independent Exploration Co.'s North Texas office in Fort Worth, had resigned to become a consultant. Through an error the picture selected to illustrate the story was a photograph of Mr. John H. Wilson, president of Wilson Manufacturing Co. of Wichita Falls, Tex. This was not correct since John H. Wilson of Wilson Manufacturing Co. is not connected with this news item in any way. A corrected account with the proper picture will be found elsewhere on these pages.

(Continued on page 168)

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

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UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE: Complete Brewster CR 300 Rotary Rig, with all tools, 4200′ 3½″ drill pipe, 2 compounded GAK Waukesha Motors. Rig in extra good condition. A bargain at $40,000.00. Just completed well in Butler County, Kansas. A. D. Allison & Co., 715 Brown Building, Wichita, Kansas.

TANKS: A-1, Reasonable: 1—10′ x 15′ Welded Rec.; 2—16′ x 8′ Bolted Steel Stock. Walkway and connections with tanks. Also 3′ x 11′ B.S. & B. 125# Separator. Fadem Pipe & Supply Co., Box 4154, Tulsa 9, Oklahoma.

FOR SALE—One truck mounted Sullivan 200 Rotary Drilling Rig complete including 2,000 feet of new 2 and 7/8″ drill pipe, drill collars, light plants, water pumps, dog house; three other trucks, one new 5 x 10 mud pump and motor operating as a separate unit. Box D-828, The Oil and Gas Journal, Tulsa, Oklahoma.

3 USED Pressure Vessels, 6′ x 20′ overall Shell 1¼″ steel, Dished Heads—1½″ steel, Weight 24,800 lbs. each. American Pipe & Supply Co., 3403 Brighton Boulevard, Denver 5, Colorado.

FOR SALE: Emsco 129 foot jackknife derrick, 10 foot substructure. Excellent condition, used on only three wells. Two 6NKU Waukesha motors, never used. 215 joints 4½ inch drill pipe equipped with new Hughes counter weld bore 6 inch tool joints. One 50 foot U.S. 2½ inch rotary hose, 3 inch connections. For price write 525 Wichita National Bank Building, Wichita Falls, Texas.

CARDWELL Spudder, Model R-L, complete with mast, power, tools, doghouse, all ready to go. $14,000.00. E. E. Brook, 807 Colcord Bldg., Oklahoma City, or Phone L.D.231.

Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE—
IN GOOD CONDITION

Complete electric generating plant, dual units, 200 KW capacity. Engines, Generators, Switchboards and Instruments. Used in oil field service Southern Illinois.

ALSO

National-Transit Steam Driven Crank and Flywheel Pump, high and low pressure side, size 24 and 48 x 4½ x 24, 20,000 gal./hr. capacity. Used in Refinery Hot Oil Service, Northwestern Ohio.

Write Box D-891,
The Oil and Gas Journal,
Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: 36-L Bucyrus-Erie Spudder, with LI-600 Cummins Diesel Engine, Unit skid mounted, 54′ steel telescoping mast, with catheads, 5″ to 7″ tools, new lines, steel dog house, 3 K.W. Diesel light plant, steel structure and floors. All equipment practically new. Will furnish inventory on request. J. C. Shaffer, Inc., P. O. Box 4365, Oklahoma City, Okla. Ph. 6-9905.

FOR SALE: Lapweld casing 2300′—5 3/16″—17#; 1000′ 6⅝″—17#; 300′—8¼″. Tubing 6000′ 2″—4½#; 3000′—¾″. Used—No. 1 condition. Also used H.P. screw gates, check valves, casing heads, anchor clamps, etc. in good as new condition. Davis McInturf, Pennsville, Ohio.

FOR SALE: Double Drum Wilson Well Servicing Machine with Pole, powered with 100 Horsepower Waukesha. With or without K B-7 International Truck. Write E. N. Brock, Box 125, Artesia, New Mexico. Phone 423-J.

FOR SALE: 1946 Cardwell QST Servicing unit with 48′ 7″x8″ Cardwell Mast. Suitable for 3500′ 2½″ tubing. Complete set tubing and rod tools. Mounted on 3-Ton EH Mack truck. Frank Jones, McPherson, Kansas.

EQUIPMENT FOR SALE

FAILING Model "1500" Core Drill, equipped for both conventional and reverse circulation, w/ 4½″ x 6″ pump, heavy-duty drillhead, Kohler 1500 W Light Plant, mounted on 1946 International K-7 truck with new motor; 1948 Ford F-6 water truck w/ 500 gal. vacuum lift and Tulsa winch; 1949 1-Ton Jeep pickup w/ 4-wheel drive and new "F-Head" motor; 500′ 2⅜″ O.D. internal flush tubing, .28 thickness w/ 2⅞″ tool joints. Can be seen in operation till Feb. 15th at 702 Wilson Street, Emporia, Kansas. Call 2539-M. New tires throughout. Top condition.

FOR SALE at Tallant, Oklahoma: One 8′ x 15′ welded horizontal tank, 3/16″ shell, ¼″ head, $350. Cities Service Oil—Patridge—Bartlesville, Oklahoma.

SLIGHTLY USED BOILERS

3—B & W Type H-4 Stirling #12 water tube 250 HP 17,000# per hour at 150# pressure, complete with Sturtevant fans, controls and motors; electric switches, CO_2 machines, burners, stacks, main valves, safety valves. Also approximately 24,000 fire brick. Priced for quick sale.

Box D-888
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

FOR SALE

100,000′ 1″ Standard Black Plain End Seamless, 16′-21′ Lgths., Tested 700#.
500,000′ 1½″ OD x .140″ Wall Recond. Seamless Tubing, P.E., 14′ & Over.
120,000′ 2″ OD x .145″ Wall 2.7# Recond. Seamless Tubing, 14′ & Over.
200,000′ 2¼″ OD x .140″ Wall Recon. Seamless Tubing, P.E., 14′ & Over.
28,000′ 2⅜″ OD 4# Good Used Lapweld Range 1 Tubing with New 11½ V-Thds. and Collars.
5,000′ 3″ OD x .300/.375″ Wall 9.7# Seamless Tubing, Plain Ends, 23′-26′ Lengths.
25,000′ 4″ OD x .140/.160″ Wall Recond. Seamless, P.E., 14′ & Over.
5,000′ 4″ Standard Black Used, T&C, Fair Grade, Good for Low Pressure Line.
1,700′ 5″ OD x .438/.563″ Wall 24.03# Seamless Tubing, 17′-25′ Lengths.
5,700′ 5½″ OD 10# Reconditioned Seamless Casing, New 11½ V-Threads and New 5½″ Collars (Recommended for Shallow Wells).
3,200′ 5½″ OD 17# Good Used Lapweld T&C Range 1 Casing.
10,000′ 6⅝″ OD 13# Good Used Lapweld Range 1 T & C Casing.
10,000′ 6⅝″ OD 18.97# Good Grade Used Lapweld, Cleaned, Beveled Ends, 20′ Random Mill Lengths.
2,500′ 7″ OD 17# Good Used Lapweld Range 1 T & C Casing, 11½ V-Threads.
10,000′ 8⅝″ OD 25# Good Recond. Casing, T&C, 8 V-Threads, Range 1.
4,300′ 10¾″ OD 32.75# Good Used Lapweld T&C Casing, Range 1, New 8 Rd. Threads and 8″ Long Collars.

THIS MATERIAL IS AVAILABLE FOR IMMEDIATE DELIVERY, SUBJECT TO PRIOR SALE

OTHER SIZES OF LINE PIPE, SEAMLESS TUBING IN SUITABLE SUBSTITUTE SIZES FOR STANDARD PIPE (EXCELLENT FOR GAS, GATHERING AND FLOW LINES), CASING AND TUBING AVAILABLE FOR IMMEDIATE DELIVERY.

FOR FURTHER INFORMATION, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) . . . 4946 Murdoch, St. Louis, Mo.

XUM

EQUIPMENT FOR SALE

FOR SALE: Fred E. Cooper-Allis-Chalmers Model W Double Drum Skid Winch complete with mast frames and electric starting. Has only worked on two wells. Would make ideal rod and tubing machine for work up to 3000'. Write or call Buckeye Supply Company, Zanesville, Ohio.

FOR SALE: BUCYRUS-ERIE MODEL 36-L SPUDDER, equipped with Waukesha GK-140 gas-gasoline engine with Butane attachments, skid mounting, Casing Tackle Strut, Tool Crane, good ⅞" drilling and casing lines, fair ½" Sand Line, and complete hand tools. Steel dog house, 1500 gallon Butane tank and Junk Rack—Price: $17,500.00. Everything in excellent condition, rig having been used for tailing-in 5" holes. Can equip with dual-tired rear axle and trailer bracket for $750.00. Also have tailing-in and top-to-bottom tools for sale. Randall-Zogg Supply Company, Princeton, Indiana. Phones: 802 and 219.

FOR SALE, Auto Car. 7½ ton truck, year 1942, Model C9064, Motor No. 60-2006, Tandem drive, with ten 1100 x 24 tires and Spare tire. Over all length of truck 31 feet, over all width 8 feet. Equipped with 50 ton Braden winch, and flat body with rolling tail gate. Size of body length 18 feet 6 inches, width 8 feet. Progress Iron & Steel Co., 117 East Market St., Louisville, Kentucky.

FOR SALE: Fred E. Cooper-Allis-Chalmers Model E Double Drum Winch Tractor complete with 8⅝" x 7" O.D. 55' mast, dual rear wheels, cross arm spudder and electric starting. Would be ideal for clean out work or pipe pulling. Write or call Buckeye Supply Company, Zanesville, Ohio.

FOR SALE: 8,000'—used 4" O.D. seamless tubing in line near Vinita, Oklahoma. Good condition, price 50c per foot. Write Box 237, Chetopa, Kansas.

AVAILABLE for sale and immediate shipment line pipe, seamless and lapweld casing, tanks. Call or write Edco Pipe & Supply Company, Box 565, Drumright, Oklahoma.

FOR SALE: Two Sullivan 37 special rigs mounted on International trucks. Waukesha and Buda drill motors, 1800 ft. Sullivan 2⅜ tool joint pipe 20 ft., two 900 gallon water tanks mounted on late model Chevrolet trucks, two 4 wheel rod trailers, two 260 gallon gasoline trailers. Equipment in top shape, used less than two years. Nothing additional needed to start drilling. Good supply extra parts. TRANS-TEX EXPLORATION CO. Box 558, Abilene, Texas. Phones 8130—2-7565.

FOR SALE: USED Failing Model 36 drill, truck mounted with operating equipment. Franks Machine Co., Enid, Oklahoma. Phone 62.

FOR SALE: Cooper skid unit with Allis-Chalmers E 60 engine. Mounted on 6X6 G.M.C. truck. With or without 8 in. X 10 in. X 65 ft. single pole mast. R. G. Scott. Seminole, Okla. Phone 877.

1—4'-0" ID x 40'-6" x 1¼" thick Tower. No trays. Tri-State Supply Company, Box 610, Mt. Pleasant, Texas.

COMPLETE Rotary Rig, mounted on Dodge Truck, Strong Derrick, Rig strong, sturdy, ballbearing throughout. 5½X10 Mounted Mudpump, Mission equipped. International Engine. Mounted 10 Barrel water Tank. 700 feet 2⅞, 12 pound drill pipe. 1500 foot water or oil rig. Money Maker. 2 men operate. Close Estate $5500. Cash. Box 106, Seminole, Oklahoma.

FOR SALE at Discount: 400 New 7" OD 10 thread J-55 Seamless Couplings, 9½" long. 400 New 7" OD 10 thread OWSCO Couplings 6½" long. Weldon Guest, Phone 5214, P.O. Box 1897, Wichita Falls, Texas.

ONE heavy duty Maphey Type B Measuring Reel with weight indicator, driven by gasoline engine, mounted on four wheel trailer. Box 11054, Ft. Worth, Texas.

ONE oilwell 36-P Triplex Pump in new condition. Stainless steel plungers and valves. Box 11054, Fort Worth, Texas.

ELI-M6W ROTARY DRILL mounted on Chevy Truck; Coleman conversion, G.D. Pump, Wash Pipe, Suction and Pressure Hose, Hex Kelly, Slips and Adapter; Hoisting Plug; 190' Drill Pipe, Front End Winch King; 9 Bits; Tool Kit. Box D-890, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: 950 Bethlehem Rig, complete. 10,000 feet new drill pipe. Excellent condition. Call or write: Glen McDonald, 2304 Broadway, Lubbock, Texas. Phone 7446.

EQUIPMENT WANTED

WANTED TO BUY: Seven inch hydraulic Casing Pulling Jacks with spiders. FOR SALE: Cardwell single drum, well service unit. Spools 10,000—¾" wire line. Box 4387, Oklahoma City, Okla.

WANTED: Used Bucyrus-Erie Spudders, sizes 24-L, 28-L and 26-L, Less tools. Write giving all details as to age, condition, location and price. Buckeye Supply Company, Zanesville, Ohio.

WANT TO BUY: Late model used **Bucyrus-Erie 28-L Emsco** Mud Pump—7¼ x 12 or 7¼ x 14. 2500' Grade J-55 or N-80 **tubing** or Grade C or D Drill Pipe—2⅞" OD—20' joints—will buy plain end. R. F. HARE, 2018 W. T. Waggoner Bldg., Fort Worth 2, Tex.

WANTED

New or nearly new 5½" O.D. H-40 or V-55 seamless oil-well casing. Also 2" upset tubing. Abandoned oil wells. Furnish complete details.

A. C. R. CO.
19615 Nottingham Road
Cleveland 10, Ohio

WANTED

To buy surplus refinery equipment

BOX D-877

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

EQUIPMENT WANTED

WANTED—Large or small spudder, with or without equipment; give age, condition, price. C. A. McMillen, 117 East Main St., Titusville, Pa.

WANTED TO PURCHASE: Used Storage Tanks from 1,000 to 80,000 bbl. capacity, either standing or knocked down. P. O. Box 2297, or phone 4-7492, Tulsa, Oklahoma.

WANTED TO PURCHASE: Used Fuller Compressor for natural gas boost. Any size from C-40 to C-100, single or 2-stage, compressor unit only or assembly with natural gas engine. Wheeler Gas Co., Box 0, Wheeler, Texas.

HELP WANTED

THE newly organized Venezuelan Atlantic Transmission Corporation requires a Chief Meter Man to take charge of installation, repair, maintenance and reading of all gas meters including orifice, direct reading and positive displacement meters. Salary plus living allowance $800 per month. Give full details in reply to P. O. Box 2819, Dallas, Texas.

WANTED

Geophysicist with geologic background and Gulf Coast experience for supervision and review seismic program Gulf Coast Area. Settled location with major oil company. All replies strictly confidential.

Apply Box D-887
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

WANTED: RESEARCH AND DEVELOPMENT ENGINEERS AND PHYSICISTS WITH EDUCATIONAL BACKGROUND IN MECHANICAL, ELECTRICAL OR ELECTRONIC ENGINEERING, PHYSICS OR ENGINEERING PHYSICS FOR OPENINGS IN PLANT AND LABORATORY INSTRUMENTATION, PHYSICAL MEASUREMENTS, GEOPHYSICS, AND INDUSTRIAL ELECTRONICS. PREFER PERSONS WITH TWO TO FOUR YEARS EXPERIENCE IN EXPERIMENTAL RESEARCH DESIGN AND DEVELOPMENT OF INSTRUMENTS, INTRICATE MECHANISMS, ELECTRONIC APPARATUS, OPTICAL EQUIPMENT, SERVO-MECHANISMS OR ALLIED FIELDS. POSITIONS ARE OF IMMEDIATE AND PERMANENT IMPORTANCE TO OUR OPERATIONS. WRITE PERSONNEL DIRECTOR, RESEARCH AND DEVELOPMENT DEPARTMENT, PHILLIPS PETROLEUM COMPANY, BARTLESVILLE, OKLAHOMA.

REFINERY POSITIONS AVAILABLE

Integrated oil company has following position openings in its modernized Oklahoma refinery:

NIGHT SUPERVISOR—CRACKING AND POLY PLANT: Responsible for direct supervision of catalytic cracking and poly plant operations, plus general supervision over all refinery workers during night shifts. Must have chemical engineering degree or equivalent and at least two years experience in catalytic cracking operations.

INDUSTRIAL ENGINEER: Responsible for the investigation of work methods in the processing, maintenance and clerical functions for the purpose of reducing costs, improving quality, or raising yields. Must be graduate Industrial Engineer with three to five years' experience and be familiar with refinery operations.

Reply to Box 1051, Tulsa, Oklahoma, giving education, age, military status, experience, and salary expected.

HELP WANTED

ENGINEERS, EXECUTIVES, TECHNICAL MEN. SALARIED POSITIONS—$3600 TO $30,000. THIS CONFIDENTIAL SERVICE FOR OUTSTANDING MEN WHO DESIRE A CHANGE OF CONNECTION. WILL DEVELOP AND CONDUCT PRELIMINARY NEGOTIATIONS WITHOUT RISK TO PRESENT POSITION. SEND NAME AND ADDRESS FOR DETAILS. TOMSETT ASSOCIATES, 1204 BERGER BLDG., PITTSBURGH 19, PA.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

PETROLEUM ENGINEER, experienced, 10 years or more, for employment in South Texas by independent operators. State age, family status and qualifications. Box D-883, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST qualified for geological work in connection with reservoir engineering. Five years experience necessary. Experience in Permian Basin desirable. Box D-857, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED IMMEDIATELY ENGINEER experienced in natural gas utility field by one of fastest growing natural gas companies in Southwest. Must have following qualifications: More than 30 years of age. Prefer person with college degree in engineering: petroleum, civil or mechanical. At least three years of college and five years of experience with natural gas or natural gasoline company, including the following phases—drafting, compressor station design and operation, hydrogen sulfide removal plants, gas well testing, gas measurement, drilling operations. Salary commensurate with experience. Pleasant working conditions, numerous attractive employee benefits after period of regular employment. Location in Dallas, Texas. Submit abstract of experience, qualifications, employment history to Box D-865, The Oil and Gas Journal, Tulsa, Oklahoma.

ELECTRICAL ENGINEER: New large oil pipeline company requires electrical engineer to handle design, construction and devise maintenance procedures, all classes equipment to 5-KV switch gear. Some familiarity with sub-stations to 110-KV, 5000-KVA desirable but not required. No communications or electronics involved. Include full professional and personal details and minimum salary, first letter. Job is permanent. Box D-761, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST, qualified for division Geologist Rocky Mountain area, with minimum eight years' experience. Wide experience desirable; four years' experience in Rocky Mountains required. Location Denver. Write, giving full details. Replies confidential. Box D-830, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

ASPHALT REFINERY
SUPERVISOR AND TECHNOLOGIST

We have an immediate opening for a man whose educational background and experience qualifies him to supervise a refinery asphalt department. He will be responsible for the development and manufacture of a wide variety of asphaltic products. We feel this is an excellent opportunity for the right man and starting salary is commensurate with ability and experience. Location: East Central U. S. Address request for application to Box D-854, The Oil and Gas Journal, Tulsa, Oklahoma, and include a brief summary of vital statistics, education and experience. All applications will be held in strict confidence.

SITUATIONS WANTED

TITLE ATTORNEY—Draft exempt, thoroughly experienced in oil industry, desires connection with a future. Box D-863, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOPHYSICIST - GEOLOGIST: Graduate, married, 11 years' experience. Desires position with independent, permanent location only. Reply Box D-868, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM GEOLOGIST
Single, Draft-exempt, Nine years major company experience, four years independent geological experience. Specialist in all phases subsurface and well work. Opportunity for advancement important. Location—open. Box D-874, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 46, 24 years experience in drilling and production operations, well completions and workover operations. Desire connection with progressive independent. Immediately available. Box D-873, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM GEOLOGIST, ten years varied experience desires responsible position in Rocky Mountains or Foreign. Presently employed; speak four languages. Box D-879, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE LINE corrosion and communications engineer with ten years experience will consider another position. Box D-884, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, M.A., 32, married, member Inactive Reserve. 1 yr. Junior Geologist, 2 yrs. Geologist with Core Drill in Mississippi with Major Company. Prefer work as Petroleum Geologist, Gulf Coast or West Texas, but will accept allied work. Box D-889, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

LEASE AND DRILLING BLOCKS

ROYALTIES

ROYALTY
Am selling a small part of the Gross Earnings, to be known as Royalty, earned by a stated size Drilling Machine. Write O. K. Machine Shop, 1026-16th St., Rock Island, Ill.

SPOT CASH PAID FOR PRODUCING ROYALTY. SMALL TO LARGEST BLOCKS IN SETTLED OR OLD PRODUCTION ONLY. Oil Specialists since 1934. GERBER & CO., 120 WALL STREET, NEW YORK.

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225 Great Falls, Montana.

BUSINESS OPPORTUNITIES

WELL ESTABLISHED British oil equipment and supply company with head office in London is interested in acting as European and Sterling Area sales representative for all classes of equipment and supplies connected with the oil and mining industries. Box D-886, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

FOR SALE: Small improved farm close to Alluwe, Okla's largest shallow high gravity oil discovery. 373 feet deep, 27 feet Bartlesville sand, lots of free oil, surrounded by secondary oil recovery just now being applied. Several old wells that can be put on pump. ½ royalty retained. $10,500.00. J. L. Fowler, 1022 W. James, Enid, Okla. Ph. 4308W.

OIL AND GAS LEASE FOR SALE
Court Receiver will offer for sale on February 24 the well-known Storey Lease located in Section 1-17-17. Has 16 shallow wells, 1 shale gas well, all pipe and extensive equipment. Splendid opportunity for repressuring or water flooding. Address Frank Brown, Receiver, Coweta, Oklahoma.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

FOR SALE

PROPERTY IN PARADIS OIL FIELD

St. Charles Parish, Louisiana

Hibernia Bank & Trust Company, in Liquidation is inviting offers for the purchase of certain of its interests in the Paradis Oil Field involving over

9000 ACRES

For particulars write:

Hibernia Bank & Trust Company, in Liquidation

Jasper S. Brock, State Bank Commissioner
Thos. B. Kennair, Special Agent
J. Edward McGuire, Liquidator
405 Baronne Bldg., New Orleans, La.

XUM

WANTED

WANTED TO PURCHASE OR LEASE

Petroleum Refinery currently not being used or portion of operating refinery available for sublet for processing and finishing partly refined stocks. Require site located Group 3 with variety unused tankage, railroad siding, barreling facilities or building, high pressure steam, ground space for installation additional refining equipment.

Write full details to

Box D-853,

The Oil and Gas Journal,

Tulsa, Oklahoma

FOR SALE

PETROL CAN MAKING PLANT

for

IMMEDIATE SALE

Automatic 4 gal. tinplate petrol can manufacturing plant by Bliss. Capacity 10,000 cans per 8-hour shift.

Full details (codeword SMAVV) from:—

F. J. EDWARDS LTD.

359-61, Euston Road,
LONDON, N.W. 1, ENGLAND

Telegrams & Cables: Bescotools, Norwest, London.

Telephones: EUSton 4681 and 3771.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418 815-15th Street, N.W., Washington 5, D. C

EQUIPMENT MEN

(Continued from page 164)

D. A. DiTirro Joins Ross Operating Valve

Domenic A. DiTirro has been named to head the sales and technical service engineering divisions of Ross Operating Valve Co., Detroit, according to an announcement by John Sainsbury, president.

DiTirro was formerly with Parker Appliance Co. in various capacities ending up as chief research and development engineer. He has wide experience in both hydraulics and pneumatics and is author of technical articles on these subjects.

Cummins Expands DD Fuel Pump Plant and Equipment

The second major expansion in the last few months has been announced by Cummins Engine Co., Inc., of Columbus, Ind. The most recent plans outlined by R. E. Huthsteiner, executive vice president, include an immediate extension, 9,600 sq. ft. on the DD fuel-pump building, completed only 18 months ago, and new machinery for increasing the manufacturing capacity for the recently announced new Cummins DD fuel pump and component parts. An expenditure of about $400,000 is involved.

This action follows closely the recent announcement of the new stores center building, started last September as the largest single expansion at one time in the company's 32-year history.

These new buildings and facilities, which are expected to be ready for use early in the second quarter, will increase the size of the plant more than 30 per cent and boost to more than $6,000,000 the amount Cummins will have expended since the end of World War II for additional manufacturing facilities and for modernizing the Columbus plant. Production capacity in a period of 5 years also has been increased about 60 per cent. The company currently employs about 2,600 people.

Reed Appoints Cleco Distributor in Mexico

The Cleco Division of the Reed Valles will maintain complete stocks of Cleco parts and accessories. The Roller Bit Co., Houston, has announced the appointment of Montes y Valles, S. A., Vallarta 1-305B, Mexico 4, D. F., as distributors of Cleco products in that area.

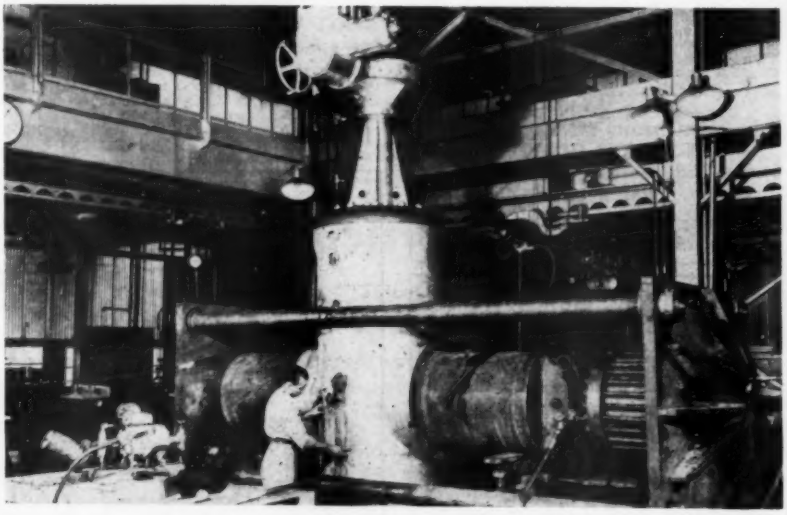
In addition to handling the full line of Cleco pneumatic tools, Montes y line includes tools for construction, manufacturing, metal fabrication, foundries, industrial maintenance, and stone carving.

Ryerson Steel Is Named Rockrite Distributor

Joseph T. Ryerson & Son, Inc., has been appointed exclusive warehouse distributor of Rockrite tubing, manufactured by Tube Reducing Corp., Wallington, N. J., it has been announced by Allen P. Beckloff, manager of the Ryerson tubular-products division.

Rockrite tubing is manufactured by a special cold-sizing process as con-

W-K-M Simulates Field Conditions to Test Valves



Using a huge, specially designed loading fixture capable of applying loads up to 1,000,000 lb. in tension and compression, and only 10 tiny SR-4 bonded resistance wire strain gages for measuring strains at critical points, W-K-M Co., Houston, tested a 30-in. gate valve under simulated field conditions in pipe-line service. Gage readings were taken on a Baldwin SR-4 strain indicator made by Baldwin-Lima-Hamilton Corp., which is shown on the table with SR-4 switching unit and a hydraulic pressure intensifier for the loading cylinder at the right end of the loading fixture.

trasted to the cold-drawing method. Cold sizing is accomplished by a combined forging and rolling action in which semicircular, taper-grooved dies are rocked back and forth over the tube, compressing the metal of the tube against a highly polished mandrel which controls the inside diameter.

Procon Elects Gilchrist To Board of Directors

M. D. GILCHRIST

Malcolm D. Gilchrist has been elected to the board of directors of Procon, Inc., a Chicago construction concern serving the petroleum and petrochemical industries. The announcement of his election was made by John C. Raaen, president of the corporation.

Gilchrist is well known throughout the petroleum industry for his efforts in acquainting the industry with new refining processes. As well as being completely familiar with oil refining in this country, he also has acquired considerable experience in foreign refining operations as a result of having spent several years actively working with refiners in numerous foreign countries.

G-E Names Belanger and DuChemin to Higher Posts

John W. Belanger, of Schenectady, N. Y., and Nicholas M. DuChemin, of Lynn Field, Mass., have been named general managers of the Large Apparatus Divisions and Small Apparatus Divisions, respectively, of General Electric Co.'s Apparatus Department, according to Ralph J. Cordiner, company president.

Both in their new capacities will be responsible to Henry V. Erben, G.E. vice president. Formerly they were assistant general managers of the department. The appointments mark an integration of the Apparatus Department into three basic units, according to Erben. These are the Large Apparatus Divisions, the Small Apparatus Divisions, and the Marketing Divisions.

Marketing operations for all products of the department will continue under Chester H. Lang, company vice president and manager of marketing for the department.

Hunter Is Vice President

William L. Hunter, formerly general manager, has been named vice president and general manager of the Northern Equipment Division, Continental Foundry & Machine Co., Erie, Pa.

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Louisiana-Arkansas

(Continued from page 156)

cause of packer trouble due to pressures the upper level has recently been shut off.

Roberts Petroleum, Inc., 1 Hill in 5-18s-13w, a shallow wildcat test in east-central Union County, was perforated and squeezed at 2,544-46 ft. Total depth of this well is 3,020 ft. with operations shut down due to cold weather.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Avoyelles Parish: Gulf Refining Co. and Humble Oil & Refining Co. 2 Altheimer, CWL NE SE 24-4n-4e, 63 bbl. oil per day from Wilcox at 4,442-45 ft., TD 6,518 ft.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Jack Collins et al 1 J. E. Caplis, SW NE NW 22-16n-12w, dry, TD 4,562 ft.

Franklin Parish: F. L. Bryant et al 1 W. P. Martin, NE NW SE 7-16n-10e, dry, TD 4,807 ft.

Union Parish: Carter Oil Co. 1 Willie Mae Stancil, C NE SE 11-20n-1w, dry, TD 8,500 ft.

Winn Parish: Gandy & Allen 2 J. F. Sullivan, SW NE NE 6-10n-2w, dry, TD 309 ft.

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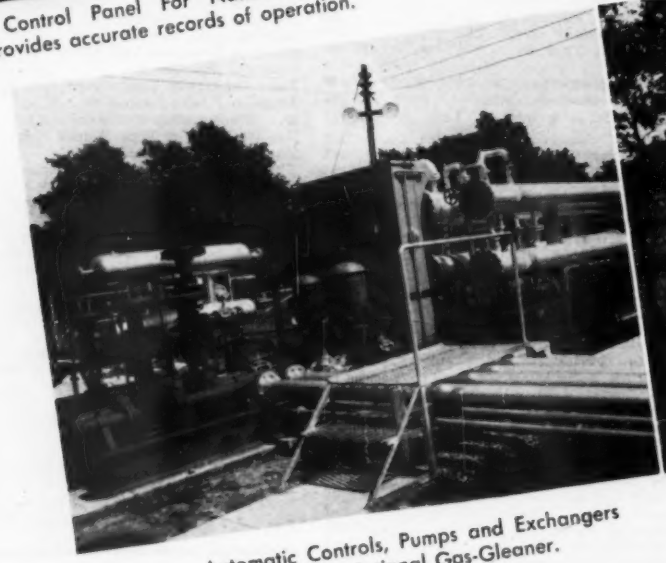
Packaged Gas-Gleaner with Heaters. Affords automatic removal and recovery of liquid hydrocarbons from natural gas streams. Gas-Gleaners are available tailored to your specific requirements.



Automatic Controls, Pumps and Exchangers Utilized in the National Gas-Gleaner.

Oil and Stripping Gas Heater Used with National "Gas-Gleaner."

"It's a National" IS MORE THAN A SLOGAN!

"It's A National" is a synonym for product perfection. National's 25 years of engineering and manufacturing experience have produced many "Firsts" in oil field equipment — from well-head to pipe line. And it has been first with many products that have revolutionized petroleum production methods or have greatly increased their handling capacities. National's new and greatly enlarged factory is equipped with the latest in plant machinery to provide bigger, better equipment for the petroleum, chemical and manufacturing industries. When "It's A National" you are assured the maximum in efficiency, economy and long life.

It's a National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

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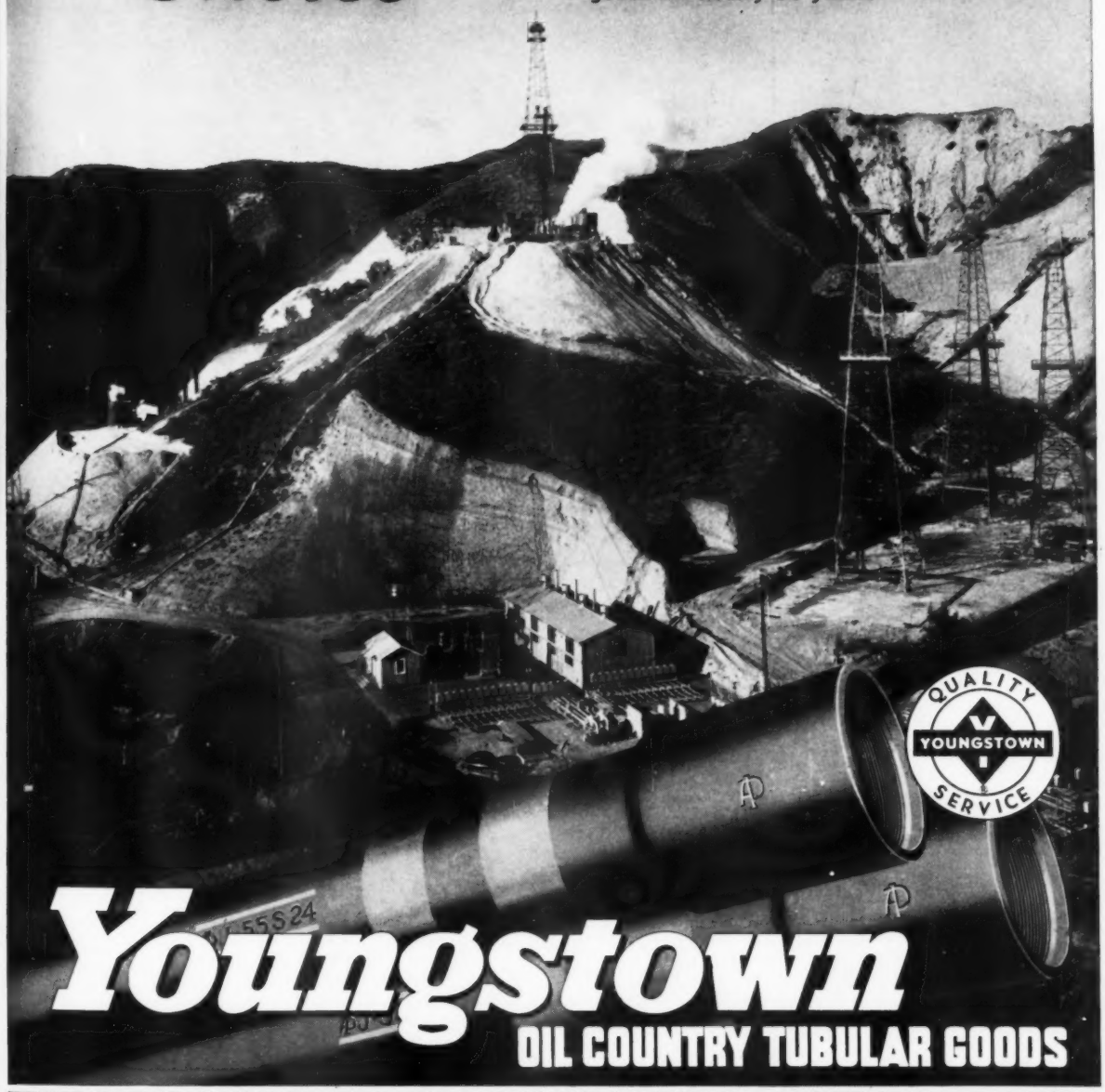
Driller's Choice

So many drillers prefer Youngstown because they know from long experience that it will perform dependably, whether the going is tough or normal. Youngstown drill pipe is dependable because it is made of finest quality steel by a company which has been fabricating oil country tubular goods for nearly 50 years.



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the mark of a good rock bit

THIS LABORATORY SHOT* shows the bottom pattern and clean, full-gauge perimeter possible with the Hughes Tri-Cone bit design. Better than any words, this hard, pink quartzite test block, having a compressive strength of 68,000 pounds per square inch, shows how efficiently this rock bit drills.

Naturally, we do not pretend that the bottoms of holes drilled in the field by Hughes bits are exact replicas of this, but we *do* think the picture depicts clearly the efficiency of the Hughes Tri-Cone design.

All Hughes Tri-Cone bits are especially designed to provide a balanced bit that is smooth running and free cutting. The spacing and angle of each tooth and row have been carefully selected to give maximum drilling speed and straight, full-gauge hole. The interfitting feature of the Hughes Tri-Cone bit, plus the scientifically-directed jetting action of the drilling fluid, assures most effective cleaning.

There is a Hughes Tri-Cone Rock Bit specially designed for each different formation. The experienced Hughes representative servicing your rig will be glad to help you select the proper type of rock bit for the particular formation you are drilling.

*Unretouched photo.

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FEB 16 1951
DETROIT

When we hit hard formations I like to use the REED '2C'

. . . says Ellis Bruce, tool pusher for Wheless Drilling Company, Shreveport, La.

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Liquid-blast
ROCK BITS

"For Travis Peak drilling I use a lot of the **REED** '2C' series of bits. I use them because my bit records show that I can depend on them for good long runs."

Mr. Bruce is shown here with a REED "2C" Rock Bit. REED "2C", "2CW" and "2CWW" Bits do a good job in Travis Peak drilling.

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REED ROLLER BIT COMPANY
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